The Wisconsin engineer. Volume 58, Number 6 [7] March 1954

Madison, Wisconsin: Wisconsin Engineering Journal Association, [s.d.]

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The Wisconsin

engineer

March. 1954

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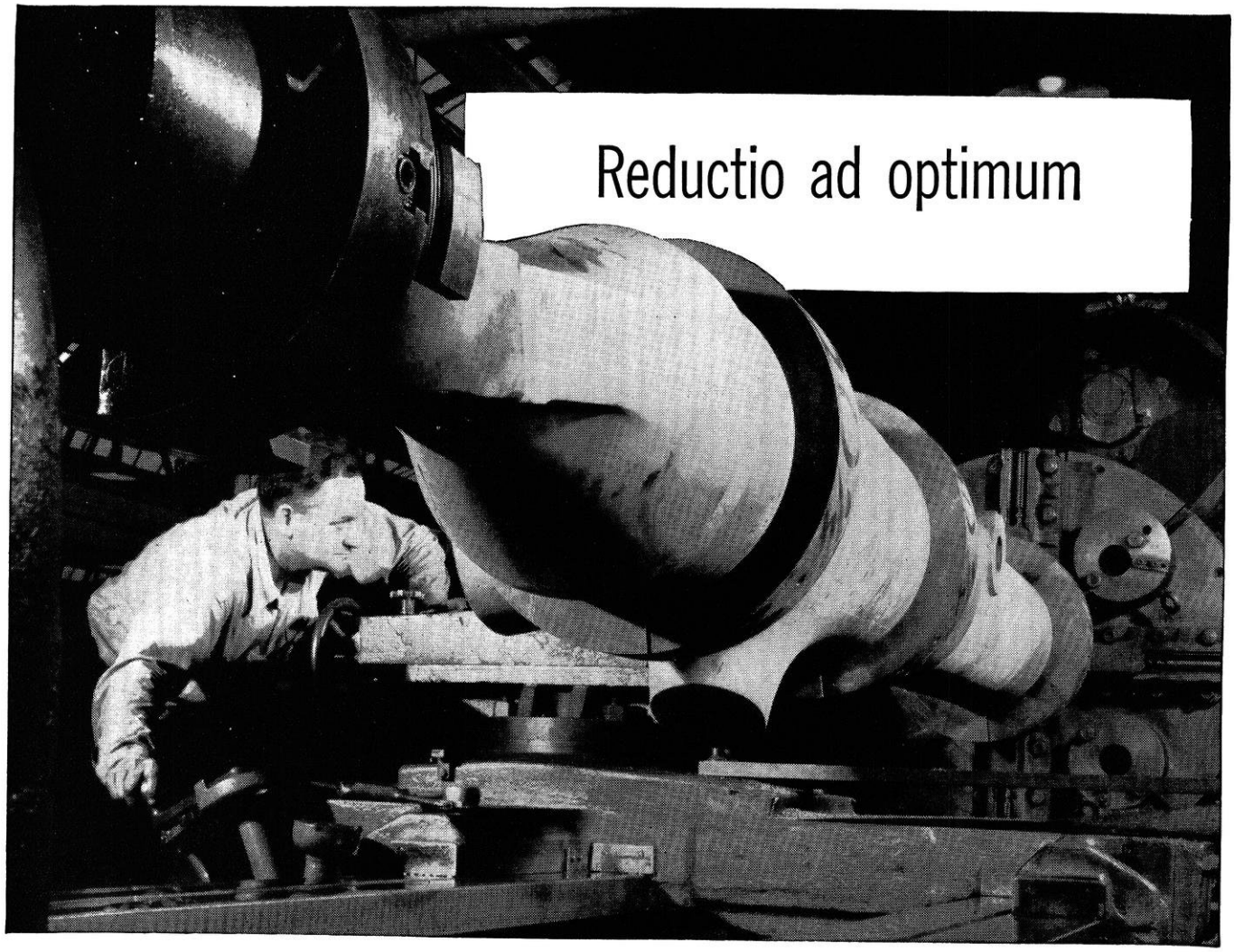
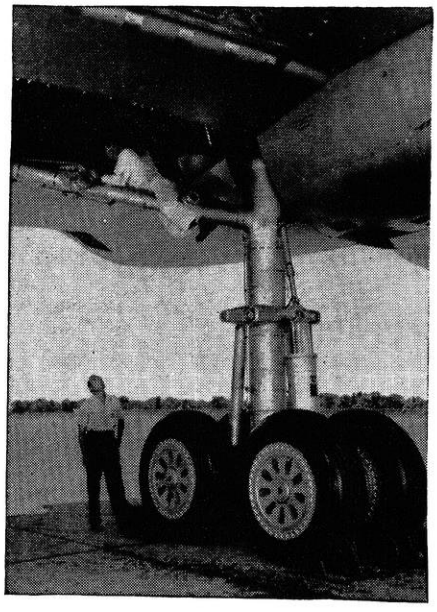


Reductio ad optimum



U·S·S CARILLOY electric-furnace aircraft quality steel meets every requirement for these vital parts. The precision machining and expert heat treatment it gets at Cleveland Pneumatic Tool Company complete the job.

● "Reduced to the most favorable degree" describes exactly what happens to the huge U·S·S CARILLOY steel ingots from which are formed the rugged main columns in the landing gears of *every* B-36.

To provide the tremendous strength and shock resistance required to safely cushion the landing impact of 179 tons of bomber weight—and, at the same time, to keep the weight of the landing gear as *low* as possible—calls not only for steel of the highest quality but also for unusual procedures in fabrication as well.

Consider these facts. The original ingot weighs approximately 37,500 lbs. From it are produced two cylindrical columns weighing only about 1200 lbs. apiece. Approximately 93% of the steel is removed by machining to proper contour and in hollow-boring the column. When finished, a mere 7% of the original ingot is left to do the job.

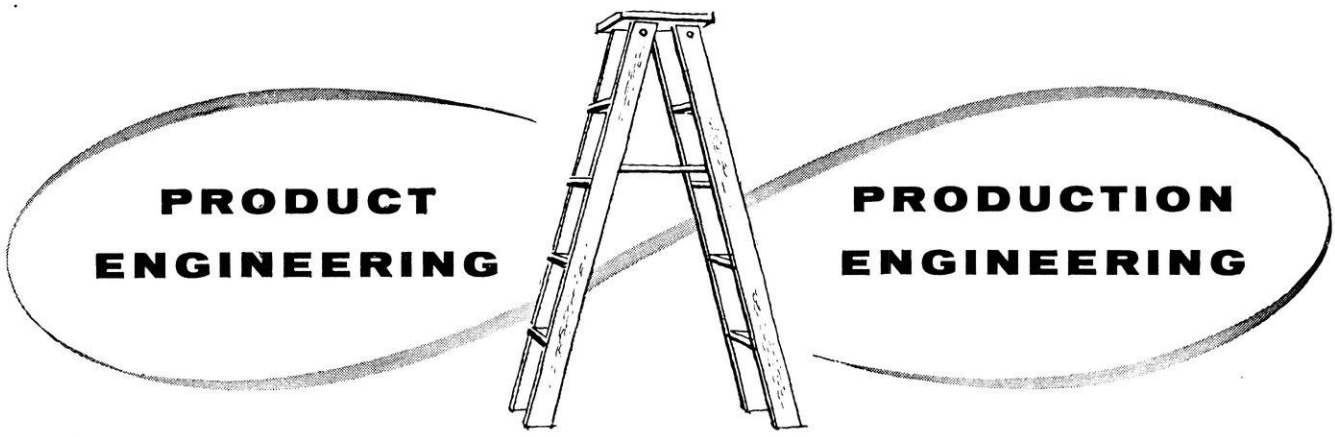
That U·S·S CARILLOY steel has been exclusively selected for this application—one of the most exacting in the aircraft industry—is, we believe, highly significant. The same care and skill, the same ability to meet requirements that are beyond the ordinary, go into every order of CARILLOY steel we make—whether it's an ingot of giant size or a few tons of special steel.

U·S·S CARILLOY is just one more example of the better steel products developed and produced by United States Steel. If you are interested in additional engineering training, why not investigate *your* opportunities with U. S. Steel? For more information, contact the Placement Director of your school, or write to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

USS

UNITED STATES STEEL

TWO MORE WAYS TO CLIMB THE GM JOB LADDER



When considering your first engineering job—ask yourself this:

What kind of person am I? The kind of person who likes to *invent* things—or *design* them?

The kind who likes to be in on the *birth* of an idea? Or the kind who likes to meet the challenge of new designs, new inventions, new ideas — by figuring out how to *build* them in quantity at a price to make them available to the greatest number of people?

For — the first type is bound to be happiest as a *Product* Engineer; the second as a *Production* Engineer.

In Product Engineering, GM offers you a successful career whether your interest lies in automotive or Diesel engineering, design, fuel and plastic research, or creating new beauties of motorcar styling.

In Production Engineering, GM also—as has been proved by its success in mass production of fine products—is a leader in manufacturing processes and production techniques, with all the fine career opportunities that this implies.

And the same goes if you have your sights fixed on Research, the exciting hunt for knowledge in the field of applied science — or if you're contemplating a career in Plant Engineering, the planning, developing, installing and maintaining of GM plant equipment and services.

Yes, there are *all* kinds of opportunities for the graduate engineer who has what it takes to climb the GM job ladder.

GM positions now available in these fields:

MECHANICAL ENGINEERING
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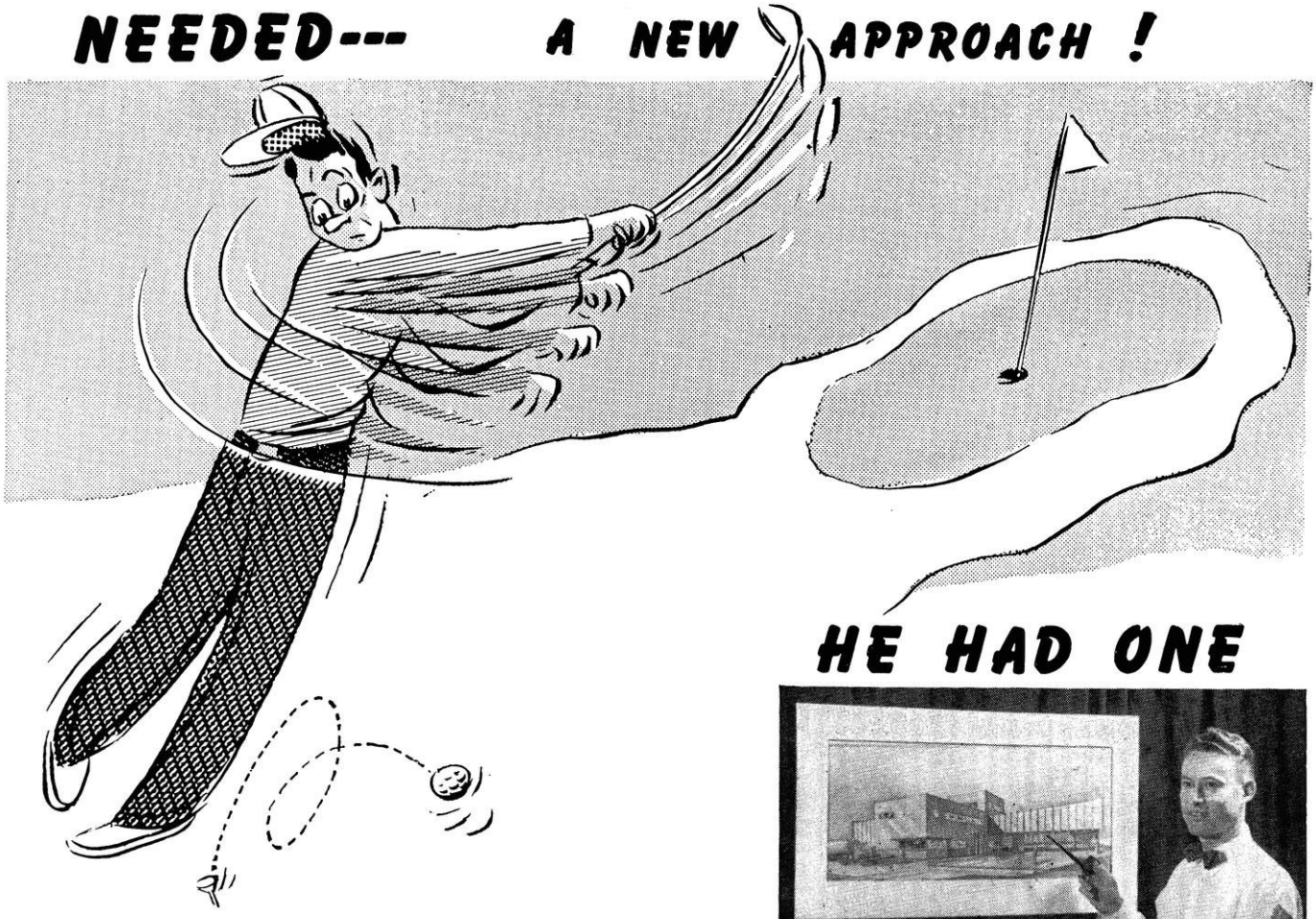

HE HAD ONE

LAMAR A. RAMOS, JR.,
Sr. Design Engineer—Airplane Engineering Division
B.S.P.E. Lousiana State U. 1941
B.S.A.E. Georgia Inst. of Technology 1947

Seen here examining the architect's sketch of our recently completed Wind Tunnel, Lamar's approach in solving complex and often unique aerodynamic problems has marked him as an engineering asset to M.A.C.

In 1947, he was first assigned to the XF-85 "Parasite" fighter, model of which he is holding above, and has since contributed his aerodynamic talents to most of our airplane engineering projects. He is presently a Group Leader concerned with the aerodynamic design of aircraft proposals. We need more young engineers like Lamar Ramos, *engineers with a new approach.*

VARIETY OF WORK is one important advantage of joining M.A.C.'s engineering team. The career opportunities in our three engineering divisions—AIRPLANE, HELICOPTER AND GUIDED MISSILE—are so varied that practically all types of engineers may be placed in a satisfying assignment, one charged with technological impact and challenge to ability. Every effort is made to place each engineering graduate in the division and assignment of his choice.

VARIETY OF LIVING in beautiful suburban St. Louis can also be yours. M.A.C. engineers are encouraged to seek advanced degrees at one of St. Louis' fine universities. The educational, cultural, medical and recreational facilities available in this city are unparalleled elsewhere.

If you're looking for our type of engineering—we're looking for you. Check your Placement Office for dates when our representative will visit your school. Ask him about the McDONNELL GRADUATE STUDY PLAN.
You may also write to:

TECHNICAL PLACEMENT SUPERVISOR
BOX 516, ST. LOUIS 3, MISSOURI

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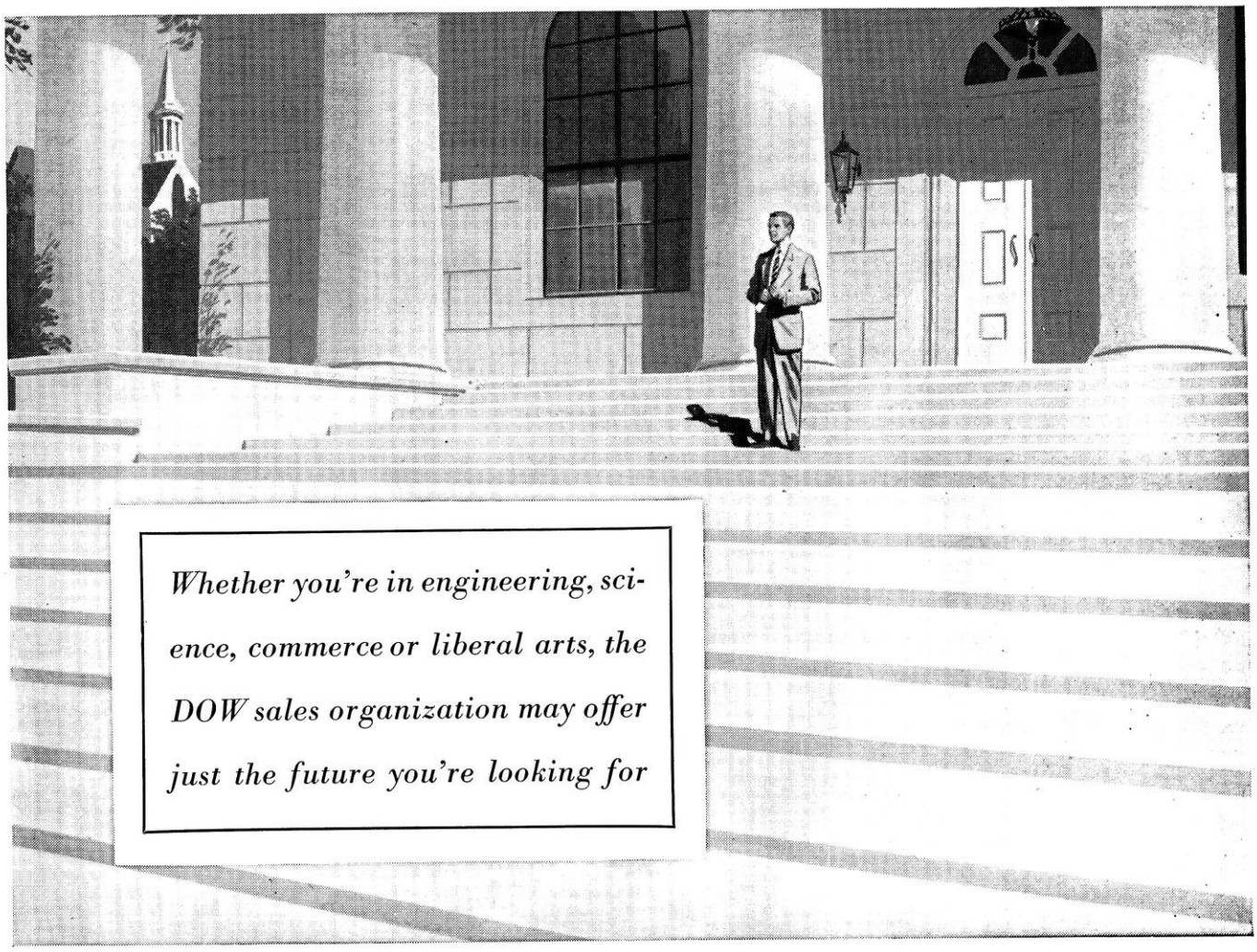
Manufacturers of AIRPLANES AND HELICOPTERS ★ ST. LOUIS 3, MO.

DOW



What About Your Future?

Your opportunities for advancement are excellent because Dow is growing—continually building new plants, developing new production operations—adding new products, opening new markets.

Dow fits you for the job with a comprehensive training course which explains company organization, policy, finance, research, production, technical service and sales methods.

You'll find that Dow is a friendly company. You'll discover that promotions are usually from within, from Dow's own staff. Seldom is an outsider considered for a top job at Dow. Moreover, you'll find a highly developed spirit of cooperation between men and departments.

At Dow, your future can be more secure because of Dow's diversification of products serving many different markets —a real advantage if business slows—and certain to multiply opportunities as business expands. Also at Dow —group insurance, pension plans and employee stock purchase plans have been a tradition.

If you or any of your friends majoring in other fields of study who have had pre-engineering or one year or more of college chemistry are interested in finding out more about a future at DOW, write to Dow's Technical Employment Department today.

Dow's Booklet, "Opportunities with The Dow Chemical Company," especially written for those about to enter the chemical profession, is available free, upon request. Write to THE DOW CHEMICAL COMPANY, Technical Employment, Midland, Michigan.

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The Student Engineer's Magazine

WISCONSIN ENGINEER

Founded 1896

DEAN WITHEY WINS HONOR

Emeritus Dean Morton Owen Withey of the University of Wisconsin was recently elected National Honorary Member of Chi Epsilon, honorary civil engineering fraternity. This award is one of the highest and most coveted in the field of civil engineering. Awards are made only once in two years to the most outstanding men in civil engineering. This year two men were elected, Dean Withey and Professor Etcheverry of the University of California. Dean Withey is one of the nation's foremost experts on concrete and has pioneered in tne advancement of engineering education. Professor Etcheverry is known as the father of modern irrigation.

Formal installation will take place at the national convention in Ithaca, New York, on April 9. Dean Withey has been asked to be the main speaker at this convention.

In This Issue . . .

Cover

Here's what the past engineering buttons have looked like, from 1946 to date. Last year's button advertises the *Engineering Exposition;* all others have proclaimed Saint Pat to be an Engineer, proving beyond a shadow of doubt that he rid Ireland of its snakes, several of which came to the U.S. to become lawyers. The beard belongs to Bill Huegel, CiE 3, the Civils' candidate for Saint Pat. *Photos by Dave Dauterman*

Frontispiece

Lightning arrester for 330-kv systems. This arrester, designed by the Westinghouse Electric Corporation, will protect 330-kv systems from lightning strokes. Designed to operate at 258 kv (line-to-ground), the unit consists of seven standard arrester units (Type SV) zig-zagged between supporting insulator columns. The arrester is designed for suspension mounting and therefore is erected easily. *Cut courtesy Westinghouse*

Articles

Departments

The Student Engineer's Magazine

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Volume 58 MARCH, 1954 *Number 5*

Entered as second class matter September 26. 1910, at the Post Office at Madison, Wisconsin, under the Act of March 3, 1879. Acceptance for mailing at a special rate of postage provided for in Section 1103, Act of Oct. 3, 1917, authorized Oct. 21, 1918.

Published monthly from October to May inclusive by the Wisconsin Engineering Journal Association, 331 Mechanical Engineering Building, Madison 6, Wisconsin.

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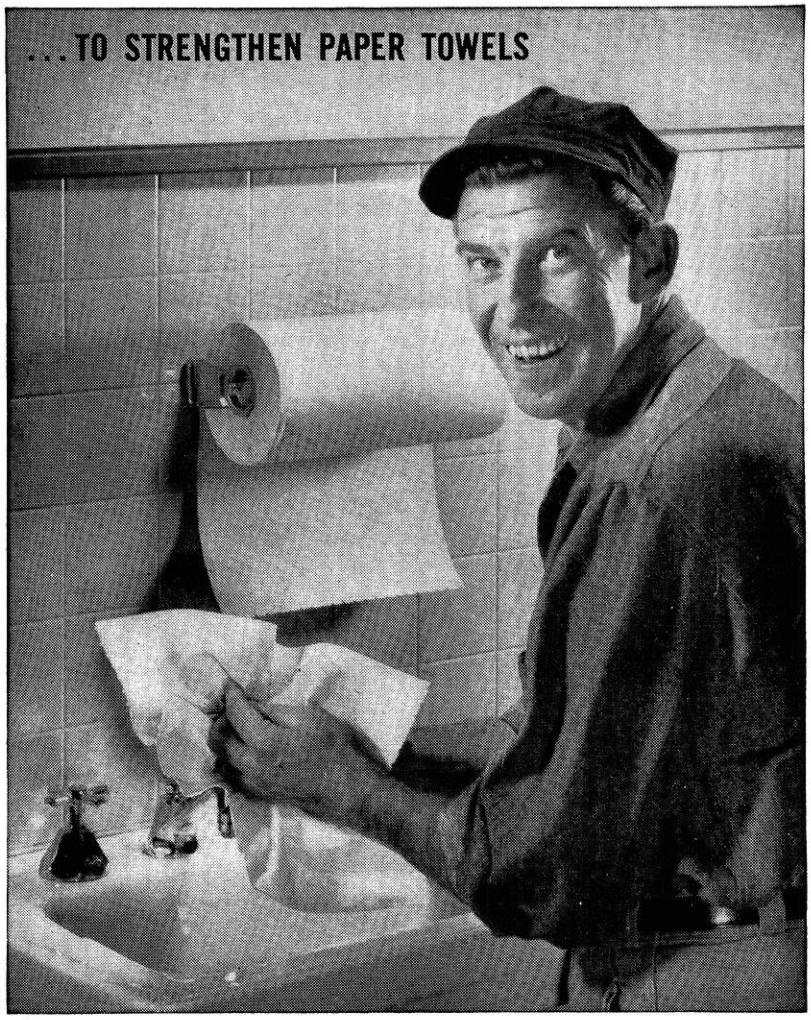
...TO STRENGTHEN PAPER TOWELS

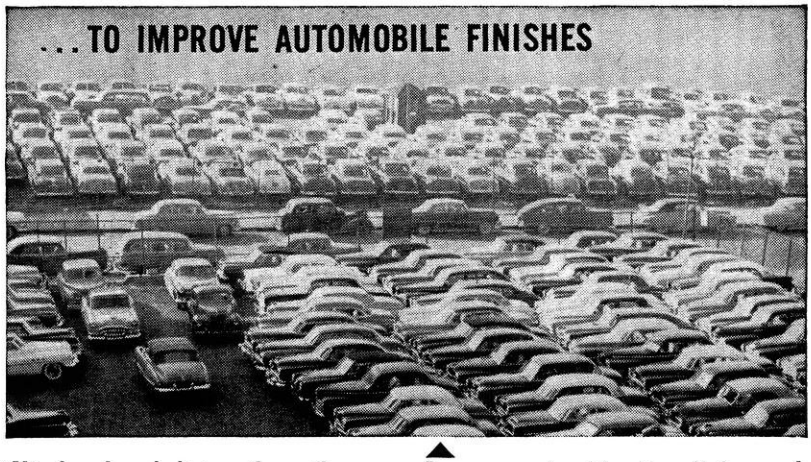


Paper towels absorb more moisture without falling apart when Hercules Kymene® resins are added in manufacture. These resins, a few of many of Hercules' varied papermaking chemicals, help improve many other types of wet-strength papers and paperboard, including map paper, V-board, and bag papers.

...TO GREASEPROOF FLOOR TILE

Vinyl and asphalt-type floor tiles are processed with Neolyn® or Mastolyn® resins to give them "built-in" resistance to both grease and alkalies, while lowering manufacturing costs.

...TO IMPROVE AUTOMOBILE FINISHES



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EC54-2

A MESSAGE TO
COLLEGE ENGINEERING
STUDENTS

from A. C. Montieth, Vice-President
in Charge of Engineering and Research,
Westinghouse Electric Corporation,
Queen's University, Kingston, Ontario, 1923

The second most important decision in your life

Now, as you near graduation, you are about to make a decision—second in importance only to choosing your life's partner.

I'm talking, of course, about that all-important first job. Which company will it be? I wouldn't presume to answer that question for you. But I would like to emphasize the importance of this decision.

You have a lot at stake. The direction your career takes will most certainly be influenced by the company with which you cast your lot. May I offer a few personal suggestions.

Choose a company not for its bigness or smallness, but for how it will treat you as an individual. Choose it not only for its engineering activities alone, but also for how it is set up to help its engineers develop themselves professionally. Choose your company with an eye on the opportunities ahead—and an eye on the future of the company itself. Above all, select a company that has a definite program to help you determine the work for which you are best fitted.

Only you can make this vital decision. Whatever it may be—good luck!

G-10275

YOU CAN BE SURE...IF IT'S
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For information on career opportunities with Westinghouse, consult the Placement Officer of your university, or send for our 44-page book, *Finding Your Place in Industry.*

Write: Mr. C. W. Mills, Regional Educational Co-ordinator, Westinghouse Electric Corporation, Merchandise Mart Plaza, Chicago 54, Illinois.

ENGINEERS' WEEK

Polygon Board has planned its annual tribute to St. Pat, the engineers' patron saint. It's Engineers' Week, March 8-13

The highlight of the program, toward which the whole week's activities will be aimed, occurs on Saturday, March 13—St. Pat's Dance. The dance is a semi-formal affair scheduled to take place in Great Hall in the Union. Harry Rothman and his orchestra will furnish music for dancing from 9:00 to 12:00. Polygon board lays out a special welcome mat for any and all non-engineers, because this is definitely an all-campus dance, not limited to members of the College of Engineering.

During the week preceding the dance, a St. Pat's contest waged between the different engineering schools will result in the crowning of Wisconsin's own "St. Pat" the night of the big dance. Each school is sponsoring one candidate. The engineers within the school earn points for their nominee by raising boards and selling St. Pat's buttons.

The beard contest is under the direction of Bob Stebens. Deadline for registration is Friday, March 12. At the dance Saturday night the bearers of the best of the brushes will be awarded prizes—in seven different categories of beard cultivation. Button sales are to start two weeks prior to the dance. James McNaul heads the committee in charge of this phase of the St. Pat's contest

An Engineer-Lawyer basketball game, which could prove to be one of the top events of the week, is being planned. Similar basketball games of years past never got beyond this initial planning; we'd like to see the game given special attention this year, to make it a success.

Hats off, then, to St. Pat's dance chairman John Zahn, general chairman; Don Ulrich, tickets; and Gilbert Bourcier, entertainment; they can use every engineer's help.

Saint Pat's Dream

The good saint dreamed,
In fancy dim saw scenes drift by,
Saw lawyers pass until it seemed,
The whole of life had gone awry!

He dreamed--in dreaming planned,
A day of days, a joy indeed,
For all true sons within the land,
Who duty-bound upheld his creed.

Saw the gathering of his forces,
Hurling war cries to the breeze,
Lords of Nature's vast resources,
Masters of the land and seas.

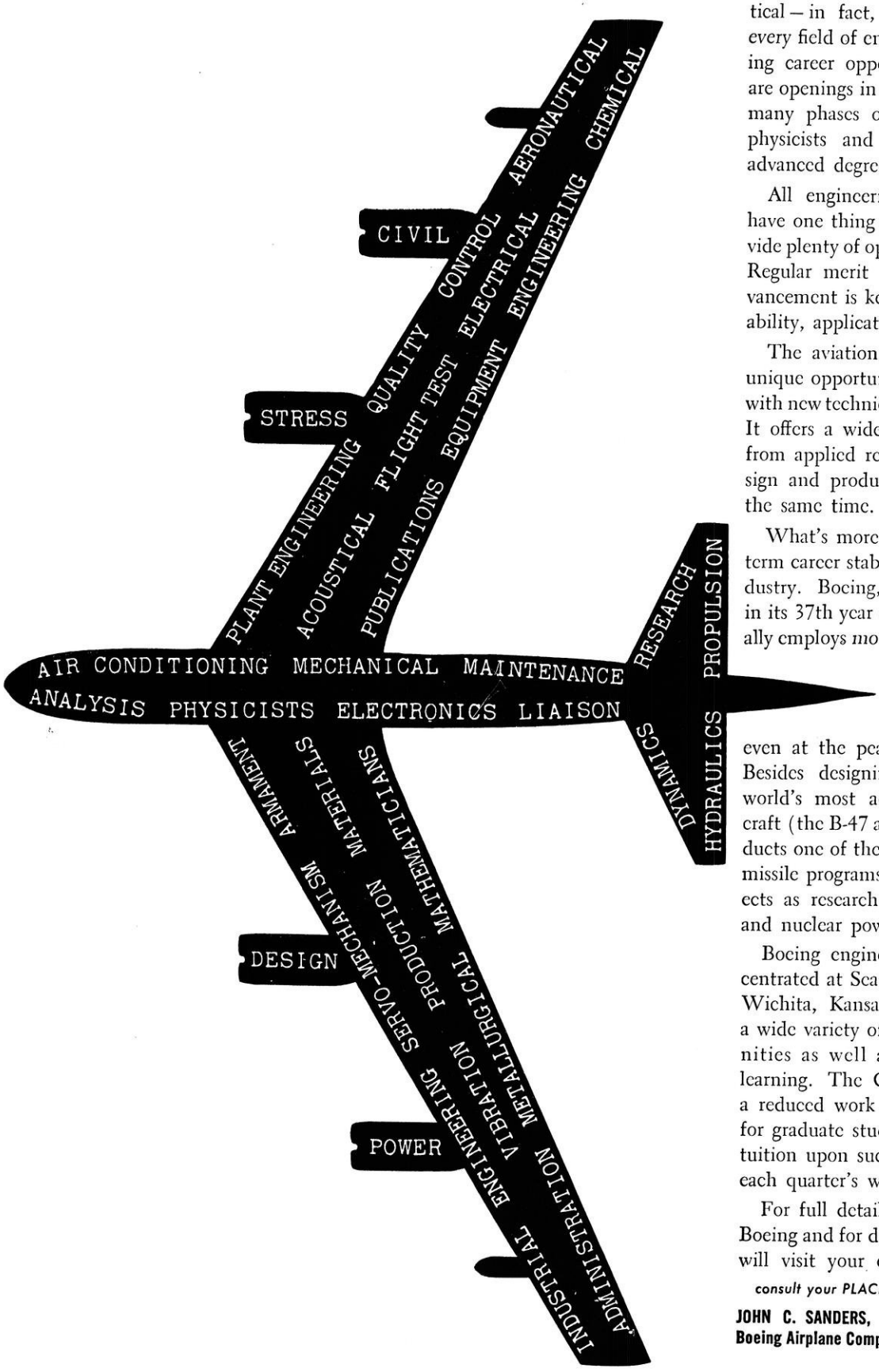
Saw lawyers bowing, lawyers scraping,
Filling all the air with wails,
Heard them pleading and beseeching,
Saw them ride along on rails!

And the P. A. D.'s did grumble,
And the Fiddledephees did groan,
Egg-filled pockets made them tremble,
As they stood before the throne.

"Hail the King!" the plumbers shouted,
And the shysters bowed in fear,
Their downfall plainly flouted,
By old Saint Pat the Engineer!

BY R. DEWITT JORDAN

Engineers of virtually EVERY type are needed on the Boeing team



Mechanical, electrical, civil, aeronautical – in fact, graduates in virtually *every* field of engineering–find rewarding career opportunities here. There are openings in design, research, in the many phases of production, and for physicists and mathematicians with advanced degrees.

All engineering careers at Boeing have one thing in common: they provide plenty of opportunity to get ahead. Regular merit reviews are held. Advancement is keyed to your individual ability, application and initiative.

The aviation industry offers you a unique opportunity to gain experience with new techniques and new materials. It offers a wide range of application, from applied research, to product design and production, all going on at the same time.

What's more, you can expect long-term career stability in the aviation industry. Boeing, for instance, is now in its 37th year of operation, and actually employs *more* engineers today than even at the peak of World War II. Besides designing and building the world's most advanced multi-jet aircraft (the B-47 and B-52), Boeing conducts one of the nation's major guided missile programs, and such other projects as research on supersonic flight, and nuclear power for aircraft.

Boeing engineering activity is concentrated at Seattle, Washington, and Wichita, Kansas – communities with a wide variety of recreational opportunities as well as schools of higher learning. The Company will arrange a reduced work week to permit time for graduate study and will reimburse tuition upon successful completion of each quarter's work.

For full details on opportunities at Boeing and for dates when interviewers will visit your campus,

consult your PLACEMENT OFFICE, or write:

JOHN C. SANDERS, Staff Engineer – Personnel
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Sandia Corporation, a subsidiary of the Western Electric Company, offers outstanding opportunities to graduates with Bachelor's or advanced degrees, with or without applicable experience.

Sandia Corporation engineers and scientists work as a team at the basic task of applying to military uses certain of the fundamental processes developed by nuclear physicists. This task requires original research as well as straightforward development and production engineering.

A new engineer's place on the Sandia team is determined initially by his training, experience, and talents . . . and, in a field where ingenuity and resourcefulness are paramount, he is afforded every opportunity for professional growth and improvement.

Sandia engineers design and develop complex components and systems that must function properly under environmental conditions that are much more severe than those specified for industrial purposes. They design and develop electronic equipment to collect and analyze test data; they build instruments to measure weapons effects. As part of their work, they are engaged in liaison with the best production and design agencies in the country, and consult with many of the best minds in all fields of science.

Sandia Laboratory, operated by Sandia Corporation under contract with the Atomic Energy Commission, is located in Albuquerque — in the heart of the healthful Southwest. A modern, mile-high city of 150,000, Albuquerque offers a unique combination of metropolitan facilities plus scenic, historic and recreational attractions — and a climate that is sunny, mild, and dry the year around. New residents have little difficulty in obtaining adequate housing.

Liberal employee benefits include paid vacations, sickness benefits, group life insurance, and a contributory retirement plan. Working conditions are excellent, and salaries are commensurate with qualifications.

A limited number of positions for Aeronautical Engineers, Mathematicians, and Physicists are also available.

Make application to: **PROFESSIONAL EMPLOYMENT**
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Or contact through your Placement Office the Sandia Corporation representative with the Bell Telephone System College Recruiting Team for an interview on your campus.

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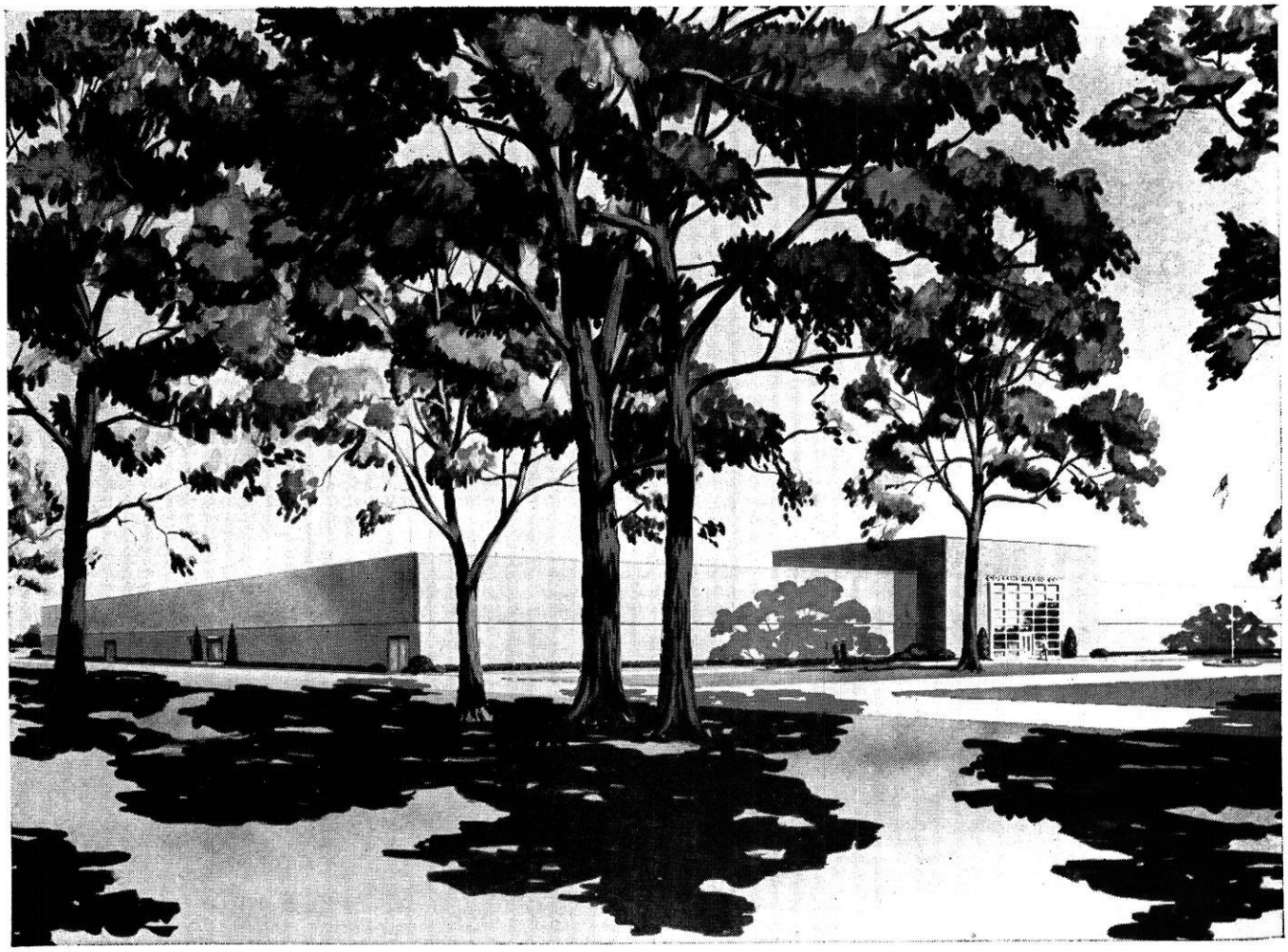

ENGINEERING GRADUATES HAVE EXCELLENT OPPORTUNITY WITH COLLINS RADIO CO.

Engineering and Research Facilities Expanded

Engineering graduates have an excellent opportunity for top starting wages and every chance for advancement with Collins Radio in Cedar Rapids, Iowa. There's the advantage of association with a well known leader in the radio-electronic field, too. Collins is 20 years old this year and has spent each of those 20 years expanding—growing—improving.

The new Engineering and Research Building pictured here is a good example of what we mean. This building is located on a beautiful 52 acre wooded tract in Cedar Rapids. It has more than 100,000 square feet of floor space and contains the latest architectural refinements. It is one of the finest, most completely equipped engineering - research laboratories in the country.

It's the nerve center for research operations in all Collins plants . . . the Main Plant and Aeronautical Laboratories in Cedar Rapids and the research-manufacturing divisions of Collins' plants in Dallas and Burbank.

If you are graduating in Mechanical, Industrial or Electrical Engineering, be sure to contact the Engineering Placement Office. They are arranging interview-appointments on campus with Collins representatives for Monday and Tuesday, March 15 and 16. Make it a point to talk with them about Collins.

For the best in engineering opportunity, it's . . .

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editorial

Take An Interest

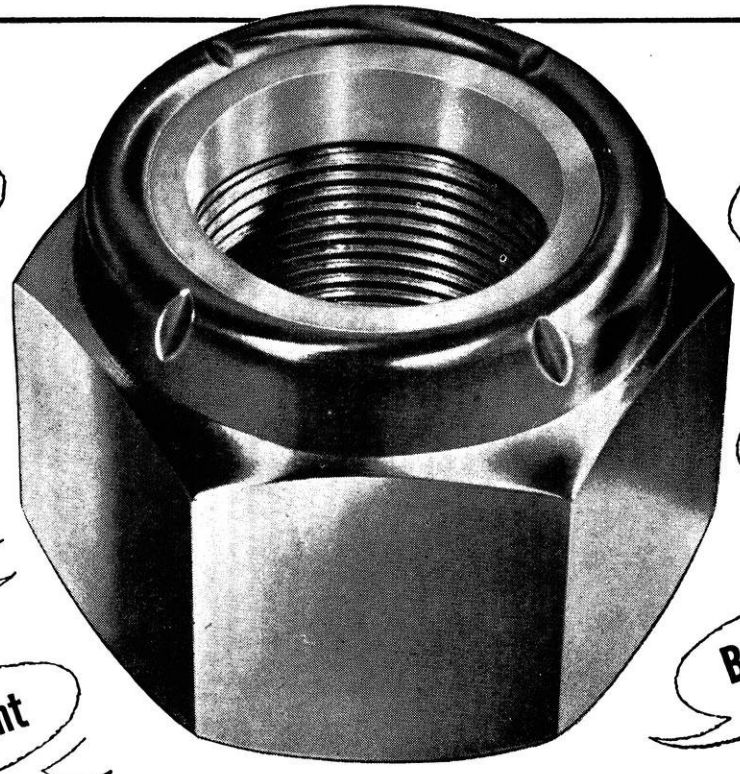
Each semester one hears of many students, engineers and L & S students alike, who aren't allowed to reenter school because of poor grades. This is a situation which need not ever occur. Almost always the fault lies with the student; those who flunk out usually go to college just because someone else tells them to, or because they find they must in order to get a good job. Most never had to study in high school and just carry that do-as-little-as-possible attitude over into college, thinking they can still get by. This same type of student doesn't seem to realize that, even if he can't get high grades, he can get adequate grades by simply taking a good interest in each of his courses and by developing a desire to get his homework done. This isn't nearly as hard to accomplish as it may seem.

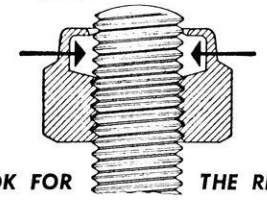
One way to develop a positive attitude toward studies is to spend time with those who already have learned to work at their books. This makes it easier to develop good habits and often can serve to inspire one to do better. Another good method is to ponder occasionally over "why am I in school?" and "how can I justify my parents' faith in my ability to succeed?" or "why not do a good job if I bother to do it at all?" One soon realizes his obligations to himself and his parents if he thinks over these questions. If he feels the desire to do a good job in his classes, he can then talk to his professors or adviser, who will give the student leads and hints on how to get the fullest measure from a course.

When one learns to take this kind of positive attitude toward school, he forgets that he once thought of classes and homework as worthless drudgery and instead thinks of them as his best chance to better himself.

K. A. G.

Whenever fastening problems arise...





LOOK FOR THE RED LOCKING COLLAR

It is threadless and resilient. Every bolt impresses (but does not cut) its full thread contact in the Red Elastic Collar to fully grip the bolt threads. In addition, this threading action properly seats the metal threads—and eliminates axial play between bolt and nut threads. All Elastic Stop Nuts—regardless of type or size—lock in position anywhere on a bolt or stud, maintain accurate adjustments and seal against liquid seepage. Vibration, impact or stress reversal does not disturb prestressed or positioned settings.

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ESNA has long been known as "design headquarters" for self-locking fasteners. Accepted by Army, Navy and Air Force, virtually every aircraft built in the past decade has been Elastic Stop Nut-equipped. On the railroads, in the oil fields, on automobiles and construction equipment, Elastic Stop Nuts manufactured to exacting quality control standards, are doing specialized jobs every day.

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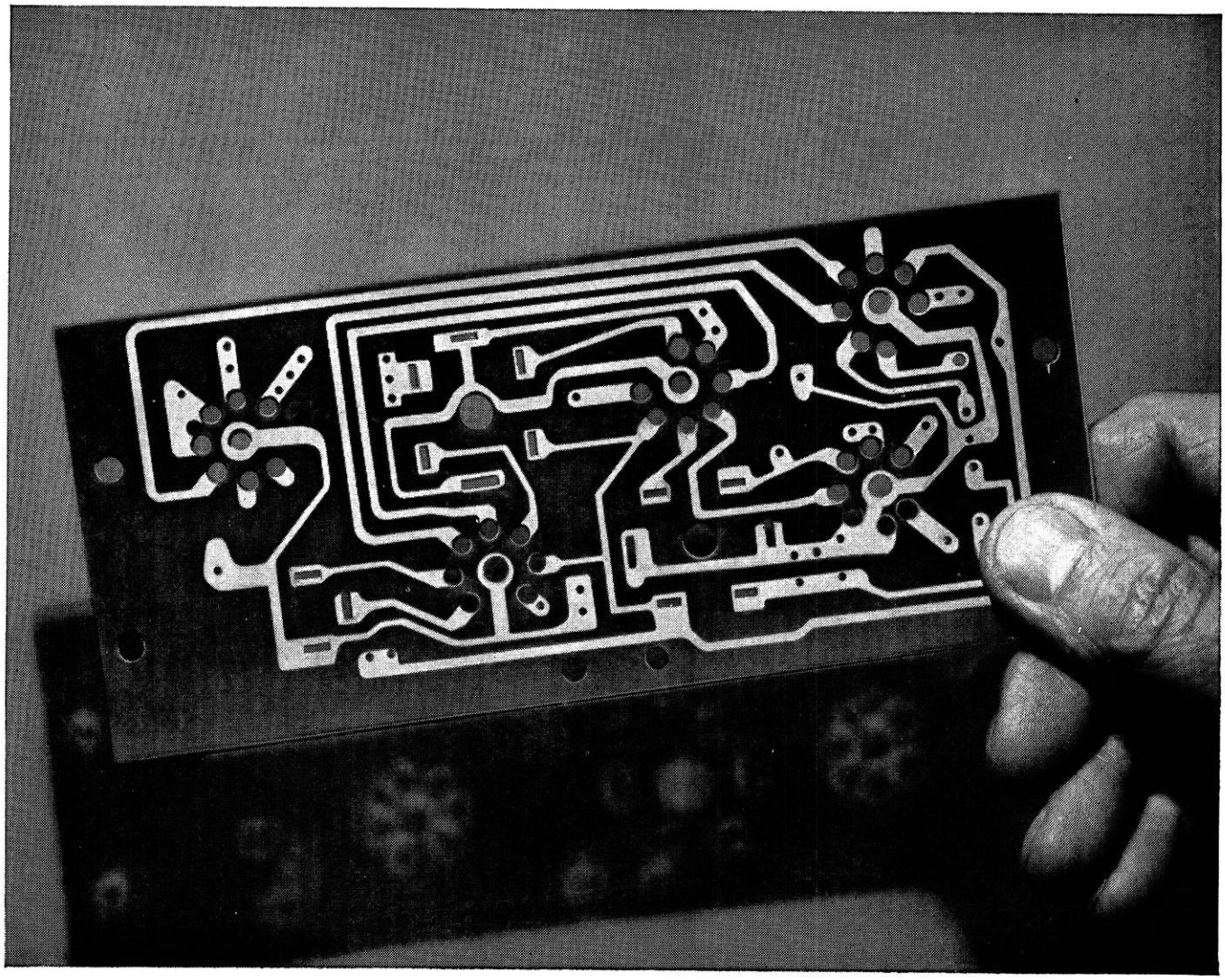
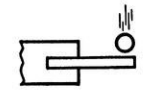
DESIGN HEADQUARTERS FOR SELF-LOCKING FASTENERS

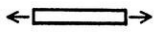


Pattern of things to come

IN ADDITION TO THE PROPERTIES ALREADY MENTIONED IN THE ADVERTISEMENT, SYNTHANE HAS

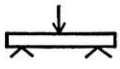


1. Impact strength. Synthane stands up in mechanical applications where jolts, jars and light shock loads are common. It does not splinter or break readily; will not delaminate.

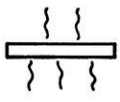


2. Tensile strength. Synthane is strong in tension and compression.

3. Light weight. Synthane has approximately half the weight of aluminum.



4. Flexural strength. Synthane is suitable for jobs where deflexion, torsion and vibration are present. It has excellent fatigue resistance.



5. Stable Over Wide Temperature Range. Synthane is thermosetting; does not flow as temperature rises, has a low coefficient of thermal expansion.

Here is one of the brightest ideas in electronics—and one of the materials which helped make it possible. The idea is the printed circuit; the material is a laminated plastic called *Synthane*.

For years radio sets were put together by laboriously soldering a forest of wires to terminals. It was a time-consuming and expensive operation. If one connection proved faulty, the whole assembly had to be rechecked.

Then someone came up with the idea of *printing* the circuit with an acid-resisting ink on foil bonded to a base—and etching away the metal not needed. It would be quick, easy and error-proof—if the right base material could be found.

Among many tested, *Synthane* was one sheet material selected. Synthane has the necessary strength, low moisture absorption, is an excellent insulator and can be punched easily. It bonds securely to metal foil and withstands the etching acid used to remove the excess metal.

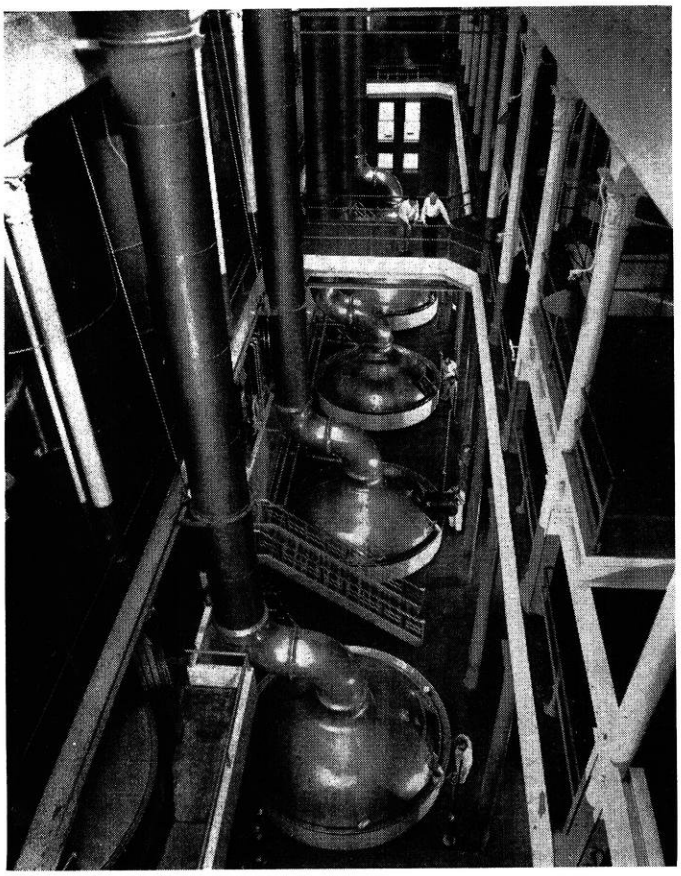
The printed circuit is still in development—but it has zoomed into favor for radio, TV, hearing aids, and many other electronic devices. There are now a dozen ways to produce what are still called "printed" circuits. And Synthane is an accepted base material for every one of them.

Synthane laminated plastics are available in a variety of grades and colors—in sheets, rods, tubes, and fabricated parts. You are invited to write for information to Synthane Corporation, 13 River Road, Oaks, Pa.

SYNTHANE CORPORATION, OAKS, PA.

SYNTHANE

LAMINATED PLASTICS



Each of the brew kettles has a capacity of 14,000 gallons. Note man adding hops to second kettle.

Recording temperature of germinating barley in malt house.

BEER

by Thomas

The Story of Beer,

The art of making beer has been known to man for at least 6,000 years; however the methods of production have been completely changed in order to make possible the enormous volumes produced annually. A modern brewery no longer depends on guesswork in any process, from purchase of grain to shipping of quality beer, but maintains high standards of scientific control.

The manufacture of beer involves malting, mashing, brewing, fermenting, storing, and packaging. The first process, malting, is done by about twelve breweries in this country; all the rest purchase their malt from the various maltsters. In the making of malt, high grade barley from Washington, Oregon, and the Red River valley is cleaned and regraded to make sure of a uniform size grain and is then stored to insure good germinating conditions. The control laboratory constantly checks the barley for starch (52-60%), protein (7-15%), fat (2%), water (12%), cellulose and enzyme activity.

Malt House Operations—steeping, germination, kilning

The barley to be malted is run into steep tanks where the grain is soaked in water until it contains about 45% water. Steeping prepares the barley for germination. The water used in this process is carefully checked and conditioned for purity and pH. The proper time of steeping is necessary or else improper germination, giving a low extract from the malt and insufficient breakdown of protein, will occur. This causes complications in later processes.

After steeping and after the barley has reached the proper conditions, it is dropped into large germinating compartments. Here it is slowly turned by mechanical screws mounted on an overhead track that moves very slowly over the bin. During germination the barley undergoes many changes. Rootlets and the acrospire are noticeable externally while the disappearance of the cell walls of the endosperm and the breakdown of proteins and starches due to enzyme action occur internally. The time for proper germination is about six days at a temperature of 50-60°F. and atmosphere of 100% humidity.

MAKING

Hurley, bioCh'56

from Barley to Bottle

The germinated barley is transferred to kilns where the germination is stopped, moisture content reduced and a color, flavor and aroma are developed. During the heatting some of enzymes are destroyed but the distase and proteinase survive. It is important that these two enzymes remain active for the mashing process. After the kilning, the barley is called malt. The sprouts are then cleaned off the grains, leaving the malt ready for grinding and mashing.

Functions of the Brewhouse—mashing, adding adjunct, mixing

The mashing process is used mainly to cause breakdown of proteins of the malt. Water at a temperature of 120°F., which is corrected for hardness and pH, is mixed with ground malt in the mash tub and kept at 120°F. so that the enzyme proteinase can break down the proteins. This action is important since it determines both the extent of soluble protein material available as yeast food during fermentation and factors affecting the foam and head retention of the finished beer.

Adjunct grains are used in most American breweries to increase the sugar content of the mash-cooker mix without increasing the nitrogen content, which results from using all malt. Too high a nitrogen content would give an undesirable, cloudy, "finished" beer. Corn and rice are two favorite cereals used as adjuncts. The cookers prepare the adjunct meal for conversion to sugar by gelatinizing at a temperature of 212°F.

The contents of the mash tubs and the cookers are brought together in the mixer tank at controlled rates so that a gradual temperature rise, from 130 to 170°F., takes place. This allows for complete conversion of the starch to soluble sugars and dextrin. Dextrin is a carbohydrate that combines with water to form a colloidal suspension of the consistency of glue. Another difference between dextrin and sugar is that dextrin is unfermentable. Obviously the brewer does not want a very high percentage of dextrin to form compared to the sugar percentage, because the thickened solution slows filtration and causes a great increase in the amount of soluble material left in the grains.

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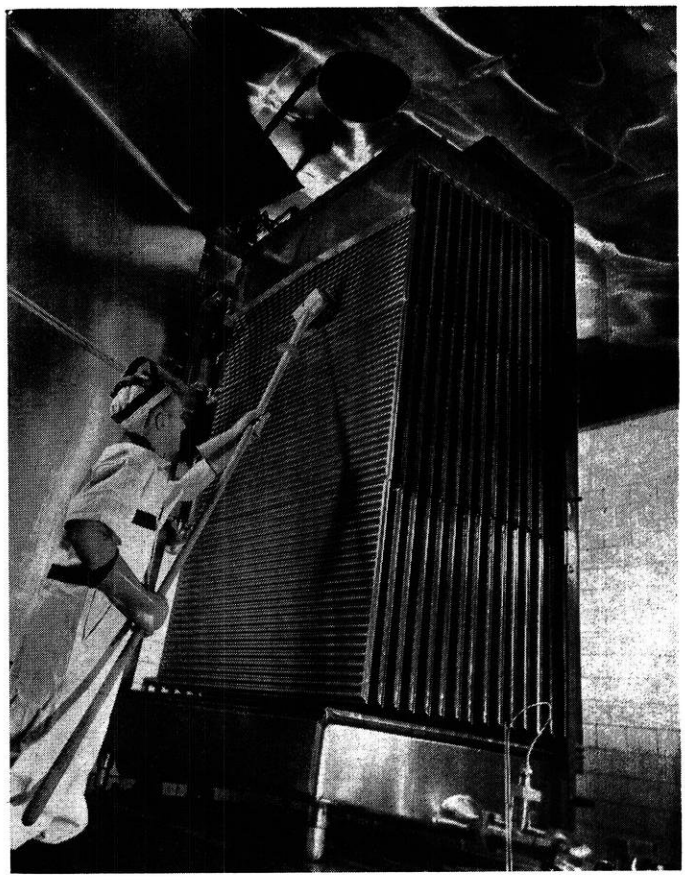
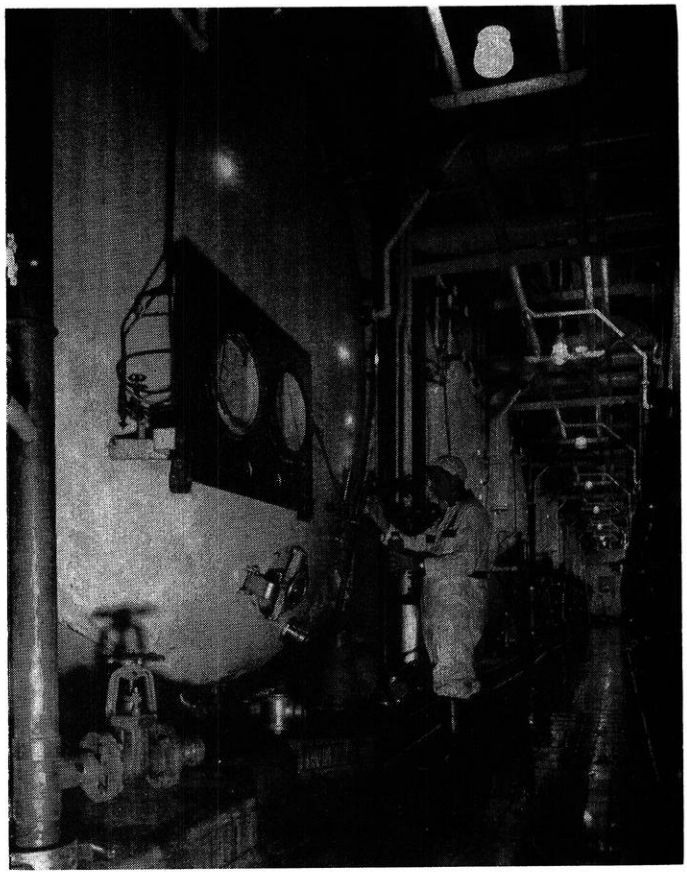


Hot wort flows down the sides of the cooler in a sterile atmosphere in order to prevent contamination. Man shown here is cleaning the cooler.



Fermentation tanks are made of steel and have glass linings. The capacity of each is 24,000 gallons.
—Photos courtesy Pabst Blue Ribbon, Milwaukee, Wis.

SANITARY ENGINEERING AS A PROFESSION

What is the training and nature of work in this rapidly growing field?

by Frank L. Flood

After graduation from Northwestern University in 1922, Mr. Flood was an assistant engineer with the Massachusetts Department of Health until 1925 when he joined the engineering firm of Metcalf & Eddy in Boston. He was made a partner in 1942.

Mr. Flood holds engineering licences in ten states, the District of Columbia and Ontario. He is a member of the American Society of Civil Engineers, Boston Society of Civil Engineers, New England Water Works Association, Federation of Sewage & Industrial Wastes Association, American Public Health Association, and the American Institute of Consulting Engineers.

He has had a hand in either the design, supervision of construction, or investigation and report of sewerage and sewage disposal problems in the following major areas: Daytona Beach, Florida; Mobile, Alabama; Newport, Rhode Island (for the U.S. Navy); Los Angeles, California; Hartford, Connecticut; Toronto, Ontario; the Allegheny County Sanitary Authority, Pittsburgh, Pennsylvania; Indianapolis, Indiana; and innumerable other communities.

In addition to special lectures in Sanitary engineering, Mr. Flood has written many articles for technical journals and magazines.

It will be the purpose of this paper to concentrate on what the young sanitary engineer should learn through college training and during the first few years thereafter.

First, I would like to summarize certain general beliefs with which I am in accord.

1. The sanitary engineer must be thoroughly grounded in the fundamental principles of the natural sciences: mathematics, physics, chemistry, geology, and biology.

2. The arrangement of courses in these subjects should be in accordance with the scope of the problems which generally arise in the practice of sanitary engineering.

3. The elements of mechanics, structural design, materials of construction, hydraulics, design of waterworks and sewage works, principles of public health and sanitation and elements of electrical and mechanical engineering should be among the subjects studied.

4. The young engineer should be able to handle surveying instruments with reasonable skill, keep notes in the field, and plot the work in the office.

5. He should be able to draw reasonably well and needs to have an appreciation of the value of well-made plans and the value of clear graphical presentation of the facts by the use of plans, charts and diagrams. The technical graduate should realize that drafting is not too menial a task for him to perform.

6. He should be able to perform the routine sanitary analyses of water and sewage.

7. The sanitary engineer needs to have a reasonably broad cultural background and to this end subjects such as English, history, and literature should be included in his education.

8. Some degree of training in the principles of economics and in business and public health law should be acquired.

9. A young engineer should learn the need for economy in the engineering expense put into the study and solution of a problem. He should have judgment as to the reasonable amount of time needed to perform a task.

10. The technical training should give a man sufficient instruction in report writing to enable him to recognize the facts to be set forth and their relative importance and should train him to present facts clearly and in logical arrangement.

11. The young engineer should become informed of the ordinary political practices and the normal operations of municipal, state and federal agencies, particularly as they affect public sanitary engineering works. Service in an appointive or elective capacity, particularly in municipal government, is of considerable value in learning to deal with municipal authorities in public works matters.

For the most part, the above conclusions relate to education up to the stage of postgraduate work. Some elaboration as to the training of the graduate engineer may be of

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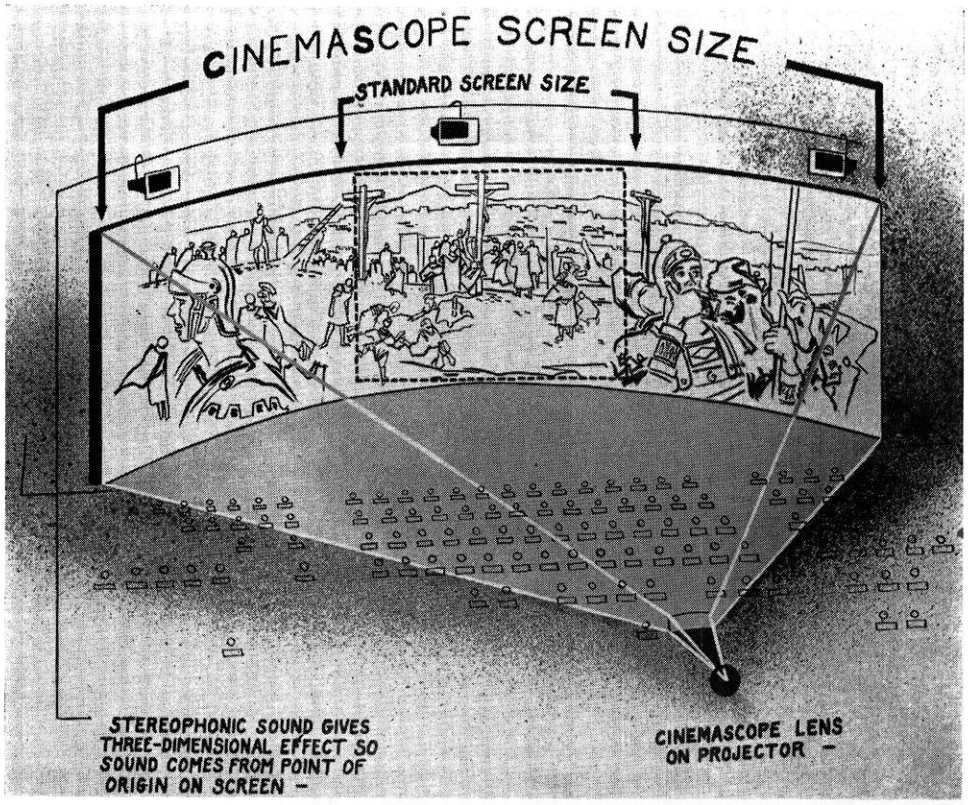


CINEMASCOPE

by Richard Paske, e'56

Whether or not Twentieth Century-Fox, the first of several studios to adopt Cinemascope, has come up with the solution to waning movie theater attendance it is still too early to judge. But certainly they have something in their 50 foot wide image, something that may revolutionize the movie industry, and surely something that has made movie goers sit up and take notice. Tagging the name Cinemascope to their recently rediscovered process, and introducing it to the public in **The Robe,** Twentieth Century-Fox has the public wondering how it works. Well . . .

The heart of the process is an anamorphic lens for the camera — a lens that compresses the width of the image but not affecting the height and a similar lens for the projector—one that will reverse the procedure and, without affecting height, will expand this width to normal once again. Thus it is possible to capture on standard 35mm film a picture which is 2.5 units wide by 1 unit high, which compares very favorably with the 4/3 to 1 ratio of standard 35mm frames. This part of the process is not new. It was introduced in Europe about 20 years ago by a French scientist, Henry Chretich, but previous lack in interest in the process had deterred its coming until now. Increasing the picture width, however, means that the camera must be quite a distance, perhaps 200 feet, from the scene to be filmed Thus, in order to obtain a reas-

(*please turn to page* 54)

Marilyn Monroe, top photo, in the compressed scene as it is photographed and as it appears on the film. Below, the same scene after the anamorphic lens has projected it to large screen proportions, 2½ times normal screen width.

SCIENCE HIGHLIGHTS

Edited by John DuBois, e'56

QUIET MOTOR

One of the oldest and most annoying headaches in industry — machinery noise — will be greatly alleviated as the result of a new electric motor design.

General Electric Company engineers, after five years of extensive research into the causes of noise in electric motors, have developed what they call a "sonant" motor.

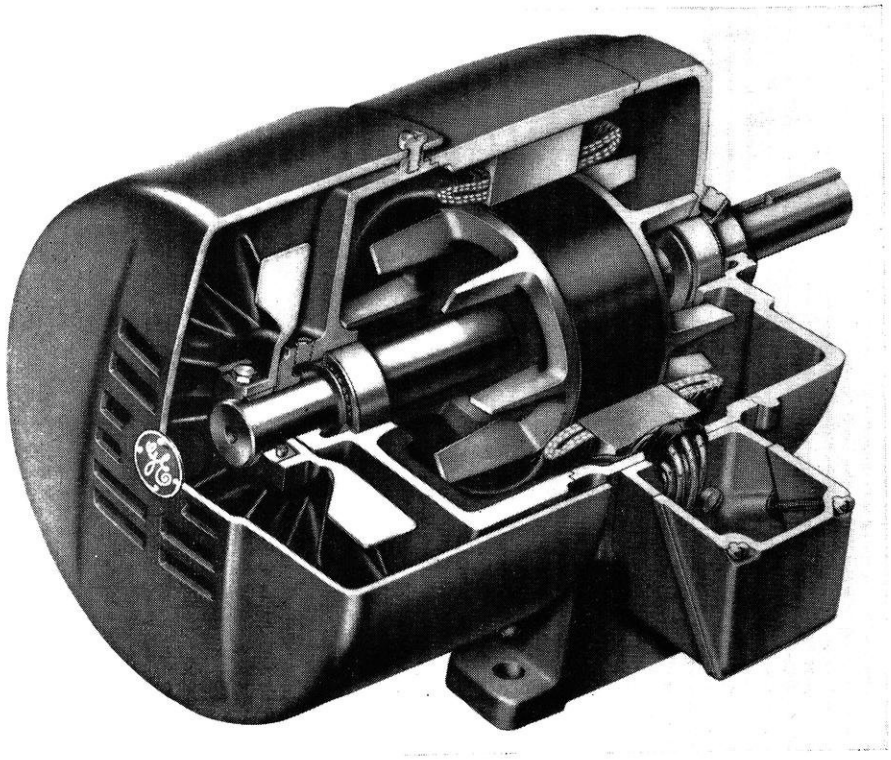
Special electronic tests prove the success of this latest concept of engineering: The new 10-horsepower motor was shown to have about the same over-all noise level as the old 2-horse-power motor.

By isolating the three main causes of motor noise — bearing rattle, magnetic hum, and windage (the rush of air through the motor)— the scientists were able to decrease the noise and, perhaps more important, make the sound frequency more pleasing to the human ear.

Since electric motors are the most widely used form of machinery in the modern world, attacking the noise problem at this level is a major technical advance for all industry, the engineers explained.

Called the Tri-Clad "55," the motor is about half as large and as much as 40 per cent lighter, horsepower per horsepower, than its predecessor.

Electric motor—small and silent.



CALUTRON SEPARATES RARE ISOTOPES

Development of an unusual ion source at Oak Ridge National Laboratory, Oak Ridge, Tennessee, through use of the calutron — a mass spectrograph—has made possible the separation of usable quantities of the isotopes of ruthenium, palladium, iridium, and platinum for the first time. The Laboratory is operated by Union Carbide for the Atomic Energy Commission.

The ion source, developed by staff members of the Laboratory's Stable Isotope Research and Production Division, operates at temperatures from approximately 3800 to 5070 degrees Fahrenheit. These temperatures are obtained as the result of electron bombardment of the graphite oven containing one of the above elements in the form of the metal. It is necessary to use the element itself because all investigated compounds of ruthenium, palladium, iridium, and platinum decompose on heating.

●

TUBE DOUBLES UHF TV RANGE

General Electric electronics experts have just developed a tiny vacuum tube with dramatic possibilities in making the nation's long-range search radar more effective. Radar sets using the new receiving tubes have been able to see and use previously indiscernible signals.

The tiny tubes also contribute to the reliability of radar through their rugged construction of ceramics rather than glass. They bring

in better signals by helping cut down "noise" in the receiver, thus removing "snow" or interference from the screen.

The tubes, one inch long and weighing one-sixth ounce, are worth several times their weight in gold. Experimental use in UHF-TV receivers has given the set performance as if the transmitter-receiver distance had been cut in half. Unfortunately for UHF viewers, however, the high cost of the tubes, and their production for government use, will keep them out of TV sets for some time to come.

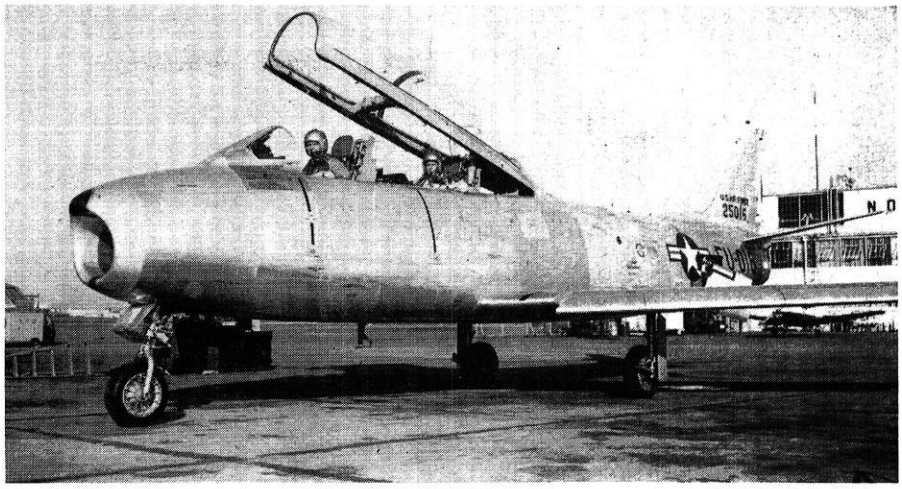
●

ULTRASONICS: NEW TOOL

The new branch of science known as Ultrasonics continues to accomplish marvels hitherto deemed impossible. One of the most interesting recent developments in this field, and one which appears to have tremendous potentialities, is in effect, an electronic machine tool, which easily drills or shapes "unmachinable" super-hard materials.

The process was developed by Cavitron Equipment Corporation, of Long Island City, N. Y., and is based upon inducing extremely high frequency, low amplitude vibrations —over 1½ million per minute—in a tool pattern shaped to any desired contour. The tool works into the part to be formed, while a mixture of abrasive boron carbide and water flows around its end. Under slight pressure the tool sinks gradually into the work as the abrasive chips away minute flakes.

Speed of the operation depends upon the size and type of material to be machined. The hardest materials can be embossed or cut to slight depths in a few minutes. Tungsten, boron and silicon carbides, hardened tool steels, cast Alnico, Ni-Hard, Stellite, and non-metallic substances such as glass, quartz crystals, ceramics and "ferrites," can all be machined by the new method.



SUPERSONIC JET TRAINER

A two-seat trainer version of the Korea-famed Air Force F-86 Sabre Jet capable of exceeding the speed of sound in a dive is undergoing flight evaluation by North American Aviation's engineering flight test section after a successful first flight.

The swift prototype is the nation's first trans-sonic trainer, and is designed for advanced pilot training in high speed flight, gunnery, and dive bombing.

In building the trainer, engineers added a tandem cockpit, dual controls and a duplicate instrument panel to the original installations of the Air Force F-86F fighter-bomber.

Only two modifications to the F-86F airframe were necessary to compensate for the additions. The fuselage section between the nose and wing roots was extended 63 inches and the 35 degree swept back wings were moved forward eight inches.

Like its predecessor, the trans-sonic trainer is powered by a General Electric J-47-GE-27 turbojet engine with over 5800 pounds thrust. The engine is anti-iced and consumes fuel at a relatively low rate.

The trainer has retained most of the performance characteristics of the original F-86F. It is rated in the 650 miles per hour class, has a maximum service ceiling of 45,000 feet and a combat radius of over 600 statute miles.

In converting the F-86F to the trainer engineers returned to the slatted leading edge of earlier Sabre models. The moveable edge reduces stalls at low speeds and allows the trainer to make slower landings.

Added to the instruments normally carried by the F-86F are an inter - communications system, an omni-directional range receiver, instrument landing system, and a directional finder.

Safety features of the trainer include separate ejection controls for both the hinged canopy and the seats, and a seat belt that automatically opens after ejection. The ejection controls may be operated from either seat armrest.

Provision has been made for the installation of two .50 caliber machine guns for gunnery practice. Retained were the battle tested APG-30 radar set and the A-4 gunsight.

For extended flight, the trainer is fitted with dual stores stations which allow the plane to carry the normal two 200 gallon droppable fuel tanks and an additional pair of 120 gallon tanks or two practice bombs.

The F-86F Sabre Jet fighter-bomber entered the Korean War during the late months of the conflict. It was credited with boosting the ratio of "kills" over the Russian-built MiG-15 to an astonishing 14 to 1 at the end of hostilities. The F-86F also performed long range fighter-bomber strikes and was used as a dive bomber in support of frontline troops.

END

Erection of a floating bridge model in the ROTC classroom.

ROTC and YOU

By Military Science Department, Corps of Engineers

What can the Reserve Officers Training Corps do for you and your career?

Most able-bodied young Americans who are about to graduate from high school have accepted the fact that they will spend two or more years serving in one of the various branches of the Armed Forces. Certainly every young American should realize that his birthright has been thus preserved by preceding generations, since the time of the American Revolution.

How can you be of the greatest service to your country and at the same time launch your own career? To the young man who has the aptitude and stamina to complete a college course, the recommended way is through the Reserve Officer's Training Corps. ROTC training will defer you until you have completed your college course and will also qualify you for a commission as an officer in one of the three branches of the Armed Forces—U.S. Army, U.S. Navy, or U.S. Air Force. As an officer, a college trained man accepts the responsibilites of leadership and therefore serves his country more effectively.

As a prospective college student, you are planning your entire college career. You should also include in those plans the part you will play in protecting this great American heritage of yours. Make those plans after understanding what the Reserve Officer's Training Corps program at the university or college of your choice can offer you. Specifically, the ROTC program offers:

1. A deferment from Selective Service during the time required to complete your college course; providing you are enrolled in basic or advanced ROTC and pursuing a full time course at the university (minimum of 12 credit hours per semester at the University of Wisconsin).

2. A commission as a 2nd lieutenant or ensign in one of the various branches of the services, and active duty for two years as an officer.

3. A complete officer-type uniform is furnished to students enrolled in the basic course.

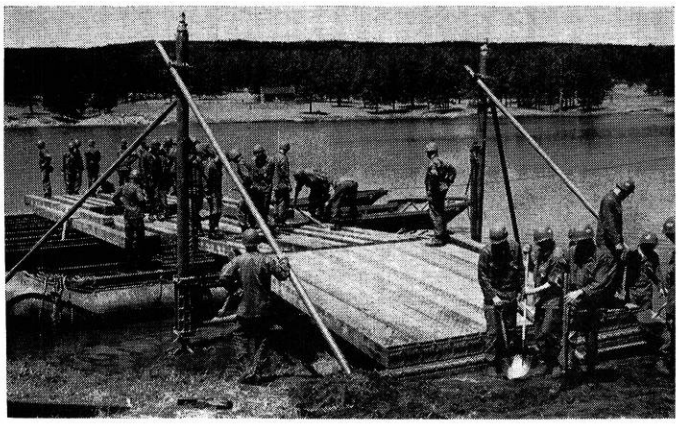
4. Advanced course students are furnished tailor made officer uniforms by the university in conjunction with the government. The uniform is given to the student when he successfully completes his course and receives a commission.

5. Payment of one ration per day is allowed each advanced course cadet. At present the value of the ration is ninety cents. This allowance is paid for not to exceed 595 days, or at present over a two year period an advanced course cadet receives approximately $535.00. This alone is a sizeable scholarship.

6. An intensive six weeks ROTC summer camp which all advanced course cadets attend. Pay at camp nets $112.50 for the period plus 5c per mile each way to and from summer camp. Also, the cadet receives rations, quarters, medical services, uniforms, and equipment while at camp.

7. ROTC textbooks are furnished free to cadets.

8. Academic credit (two credits per semester) is given for successful completion of the advanced course.



Construction of a floating bridge by ROTC cadets at Summer Camp.

How has the profession of military science become so entwined in the curriculum of almost all colleges and universities throughout the land? It was started in 1918 when Captain Alden Partridge, a former superintendent of the United States Military Academy, founded what later became Norwich University. His aims were "To fit young men for their duties as citizens . . . to make students competent to take the part of their country should their services be needed to defend its honor or interests in the field." Actually, the ROTC received its greatest impetus through the Morrill Act of 1862, which authorized grants of lands to educational institutions which would include military tactics in their curriculum. These institutions became known as land grant colleges. The University of Wisconsin is such a college. State law has made ROTC compulsory for the first four semesters of all college courses.

The present day ROTC was born in 1916, with the enactment of the National Defence Act. The wisdom of this legislation was manifested by the fact that by 1942 the ROTC had commissioned 159,853 officers and of these had called 93,000 to active duty.

What is the mission of the Reserve Officer's Training Corps program? "The primary purpose of the Reserve Officer's Training Corps is to produce commissioned officers for regular service and for the organized reserve units of the Army, Navy, and Air Force." However, in order to produce the primary product, there is a much broader principle to consider. Generally a hand full of men guide the destinies of a military force, a successful business enterprise, or a government. These men are leaders—they are leaders because they can inspire others to do their best work. They express themselves clearly and forcefully. They command respect wherever they go. The broad purpose of the ROTC is to develop the qualities required for civilian and military leadership that will train young college men to take their rightful places in their communities.

How can you get the most out of ROTC training? A successful student plans his course of action as a successful man must plan his career. Every step should be forward. When you stop learning you stagnate and your course of

Vice-President Ira L. Baldwin making awards to outstanding ROTC cadets.

action or career fails. From the day a young man enrolls in college he should strive to get the maximum from his ROTC courses, particularly as far as leadership training is concerned. In the basic courses, the student is taught leadership and theory under the supervision of the advanced course cadets (juniors and seniors) and his military instructor (usually a commissioned officer). He is actually learning the ABC's of military training and is being trained to carry on some of the instruction when he qualifies for the advanced course. From the very start set your standards high enough to become a distinguished military student. With good grades and evidence of leadership (and remember leaders are made, not born) your instructor will recommend you for the advanced course. With continued good grades in both military and academic fields you can qualify as a distinguished mili-

(please turn to page 54)

W.S.P.E.

Edited by Jon Baumgartner, ch'56

SECRETARY'S OFFICE
2318 Rowley Avenue
Madison 5, Wisconsin
E. C. Wagner, Secretary

ANNUAL MEETING

The eleventh annual meeting of the Wisconsin Society of Professional Engineers, held January 28-30 at the Schroeder Hotel in Milwaukee, was opened by the traditional get-together with informality as the keynote. The turn out for the get-gether on Thursday evening was very satisfactory. There were about 175 people present and all seemed to be enjoying themselves. This is a little larger group than usually attends these functions. Ed Hanley did a fine job as master of ceremonies, but we have come to expect a fine job from Ed. Many of us saw for the first time three dimensional pictures shown by means of the recently developed projection equipment by the David White Co. These pictures were for the most part of the summer conference held at Elkhart Lake. The barbershop quartet furnished by the Blatz Brewing Co. delighted us all with old and new songs. About eleven o'clock a tempting buffet was served and thus our meeting was off to an auspicious start.

PRESIDENT'S REPORT

Pierce G. Ellis
Annual Meeting January 28, 1954
Milwaukee, Wisconsin

Publications

During the past seven months one area in which substantial progress has been made is in our publications. This includes the section in the monthly **Wisconsin Engineer,** of which there have been four issues, and our own Newsletter, of which there also have been four issues. This is an average of more than one publication per month and this sharp stepping-up of the publication tempo can be largely credited to the diligent search for news by our energetic publications committee chairman, Mr. John R. Frederick of Madison.

We hope you like the two innovations our publications chairman has brought you this year, namely, the series of biographical sketches of chapter presidents in the issues of **Wisconsin Engineer,** and the complete directory listing in the first Newsletter of all chapter officers and committee chairmen, as well as officers and committee chairmen for the society at the state level.

While there has been substantial improvement in the flow of news from the chapters to the state, our efforts are still falling far short of a really good job because these communications approximate only an unsatisfactory trickle of the news available for reporting. I urge you to review these publications and to insist upon **all** of the newsworthy items of your chapter being submitted promptly for publication. The committee issued early in the administrative year a brief manual of instructions to chapter correspondents, covering **what** is news, **where** to look for it, and **how** to report it, for the guidance of your chapter correspondent.

It is my hope that in this year we can so improve our line of communication between the chapters and the state that the recent desire of one chapter, that we establish our own magazine, can be realized in the near future. At present, the volume falls far short of meeting this goal.

Other Committees

With fifteen committees in operation there is obviously insufficient time to permit all to report their important preceedings here to you today and, unfortunately, for me to even comment on them briefly. It is my hope that during the remainder of the administrative year we can accelerate the rate at which news releases of these activities can be brought to you through **The Wisconsin Engineer** and the Newsletter.

Functional Groups

I am happy to call to your attention the changes in our convention program which permitted the functional group meetings to be scheduled for the opening session today, and the effort the functional group chairmen have put forth in preparation of agendas for their respective meetings open to you earlier today. We can look forward shortly to a summary report to the convention by these groups of their proceedings.

Chapter Activities

One of the most pressing prolems evidenced to me in my travels to chapter meetings is the pressing need to create new chapters. Several of our chapters cover so much area geographically that meeting attendance is definitely retarded by the long travel distances, regardless of how centralized the meeting location may be. Then too, the working effectiveness of the chapter organization is seriously impaired because of the wide-spread distribution of its officer and committee personnel and the resulting barrier to easy and quick communication between one another.

To promote the breaking off of areas to form new chapters, or to effect some realignment or rearrangement of several chapters to form more realistic geographic groupings, calls for courage and aggressive action, but it is unquestionably necessary, in my opinion, if we are to grow at a rate we have a right to expect. Several of our existing, and I might say very healthy, chapters were initially organized with only a handful of visionary members — groups barely large enough to meet the by-laws requirement of ten members.

At first these newly formed chapters grew rapidly, but for the most part the growth rate has now decreased substantially by any measure that may be employed. I urge that we now shed what could be termed the complacency that has overcome us and replace it with an impatience and unwillingness to be satisfied with any circumstances that prevents our giving maximum service to our members, to the profession, and to the community.

A small pioneer group of ten to twenty members in a new chapter will of necessity need to possess great stamina and fortitude in order to survive the struggle. But in that struggle they will shed the mantle of vitiating complacency and exemplify the priceless motto of our great State of Wisconsin inherited from our pioneer ancestry, "FORWARD!"

Report of
WSPE Legislative Committee
July 1953—January 1954

The legislative committee's activity has been largely correspondence. A report was made at the summer meeting Elkhart Lake on legislation of interest to the professional engineer. This report included items in our registration law that had been discussed by individuals or groups of our WSPE which could have been used as a basis for discussion at chapter meetings. Copies of that report were put in the hands of the chapter legislative committee chairmen and chapter presidents.

Since last September your chairman has attempted to have definite ideas submitted by the WSPE membership which they would like to have considered by the legislative committee. Two requests were sent to chapters through their legislative chairmen and presidents in an effort to bring forth ideas from the individual members, and a formal announcement was published in the WSPE section of the November **Wisconsin Engineer** requesting that definite ideas regarding changes in our registration law or any other items of legislation be submitted for consideration before the annual meeting. Some individual members who had previously shown an interest were also contacted for their specific suggestions.

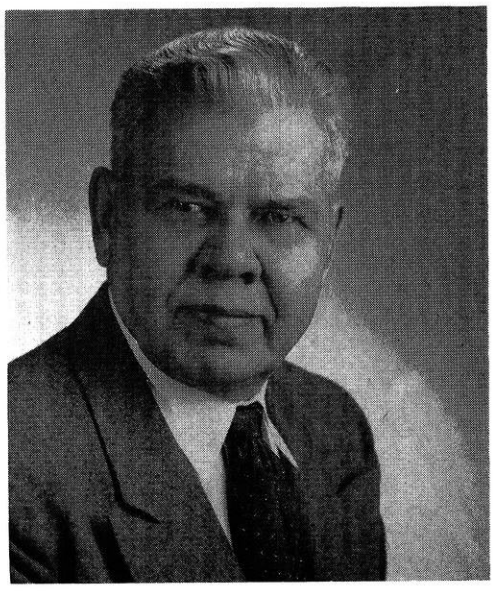
Since no suggestions were submitted, the two Madison members and your chairman held a meeting January 15th to discuss the items of the September report. It was decided at that meeting that, in view of the lack of response to the numerous requests for definite ideas on legislative changes, there is no reason for advocating any changes in the registration law or other items of legislation at this time.

It is suggested to the board of directors, however, that WSPE sub-

(continued from page 40)

Frederic T. Agthe receiving award from Pierce G. Ellis.

MEET THE PRESIDENTS



Louis J. Larson
Milwaukee Chapter President

The president of the Milwaukee chapter of WSPE, Louis J. Larson, is a product of our neighboring states of Minnesota and Illinois, but since he has been a Milwaukee engineer since 1927, we proudly acclaim him as our own. His present position of consulting engineer in welding for Allis-Chalmers Mfg. Co., he has held since 1942. He has held presidencies of Wisconsin Section of American Welding Society, Wisconsin Section of American Society of Civil Engineers, and district organization of ASCE. Before being elected to the presidency, he served WSPE as chairman of the due committee, NSPE as member of committee on Engineer in Industry, and the Milwaukee chapter as member of the committee on Fees and Classification. He is a member of Sigma Xi and Tau Beta Pi, having held the presidency of the Milwaukee alumni chapter of the latter. He is also an active member of the Episcopal Church, the Masons, and the University Club of Milwaukee.

Louis J. Larson was born in Heron Lake, Minnesota, and received the major share of his education in this state. He studied civil engineering at the University of Minnesota, from which he received his B.S. degree in 1914, and C.E. in 1915. He took graduate work in mechanics at the University of Illinois, from which he received his M.S. degree in 1917. He returned to the University of Illinois in 1920 as a member of the faculty, and taught mechanics, strength of materials, and hydraulics until 1926. During his summers in this period, he variously worked on railroad construction and testing and drainage surveys, and from 1917 to 1919, served the U.S. Bureau of Standards as assistant engineering physicist on tests of war products, including load tests on largest Navy floating crane and on the Arlington building, which had new structural features. From 1927 to 1938, he was employed by the A. O. Smith Corp. as director of welding research and welding consultant, in charge of the welding laboratory. He has been a consulting engineer, including expert witness in court cases on welding problems, for clients in Pennsylvania, Michigan, Illinois, and Utah, as well as Wisconsin, from 1938 until the present time. In his present position, he has worked on defense and war production projects, including direction of welding equipment for atomic bomb projects, and welding consultant work for Argonne National Laboratory.

Mr. Larson married Blanche Hollandsworth on June 26th, 1918. They will celebrate their thirty-sixth wedding anniversary this year. Mr. Larson is an active bowler, and retains his interest in football, though no longer as an active participant. Also, as a Milwaukeean, he is of course interested in the achievements of the Milwaukee Braves, National League pennant winners of 1954.

THE HYDROSTATIC TEST

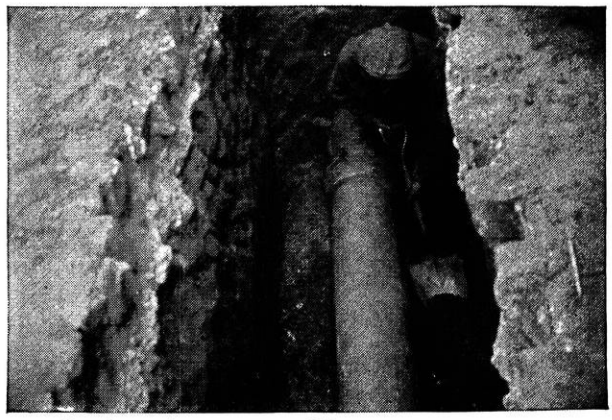
Nobody can buy a length of cast iron pipe unless it has passed the Hydrostatic Test at the foundry. Every full length of cast iron pipe is subjected to this test under water pressures considerably higher than rated working pressures. It must pass the test or go to the scrap pile.

The Hydrostatic Test is the final one of a series of routine tests made by pipe manufacturers to assure that the quality of the pipe meets or exceeds the requirements of standard specifications for cast iron pressure pipe.

Few engineers realize the extent of the inspections, analyses and tests involved in the quality-control of cast iron pipe. Production controls start almost literally from the ground up with the inspection, analysis and checking of raw materials—continue with constant control of cupola operation and analysis of the melt—and end with inspections and a series of acceptance and routine tests of the finished product.

Members of the Cast Iron Pipe Research Association have established and attained scientific standards resulting in a superior product. These standards, as well as the physical and metallurgical controls by which they are maintained, provide assurance that cast iron pipe installed today will live up to or exceed service records such as that of the 130-year-old pipe shown.

Cast iron pipe is the standard material for water and gas mains and is widely used in sewage works construction. Send for booklet, "Facts About Cast Iron Pipe." Address Dept. C., Cast Iron Pipe Research Association, T. F. Wolfe, Engineer, 122 So. Michigan Ave., Chicago 3, Illinois.

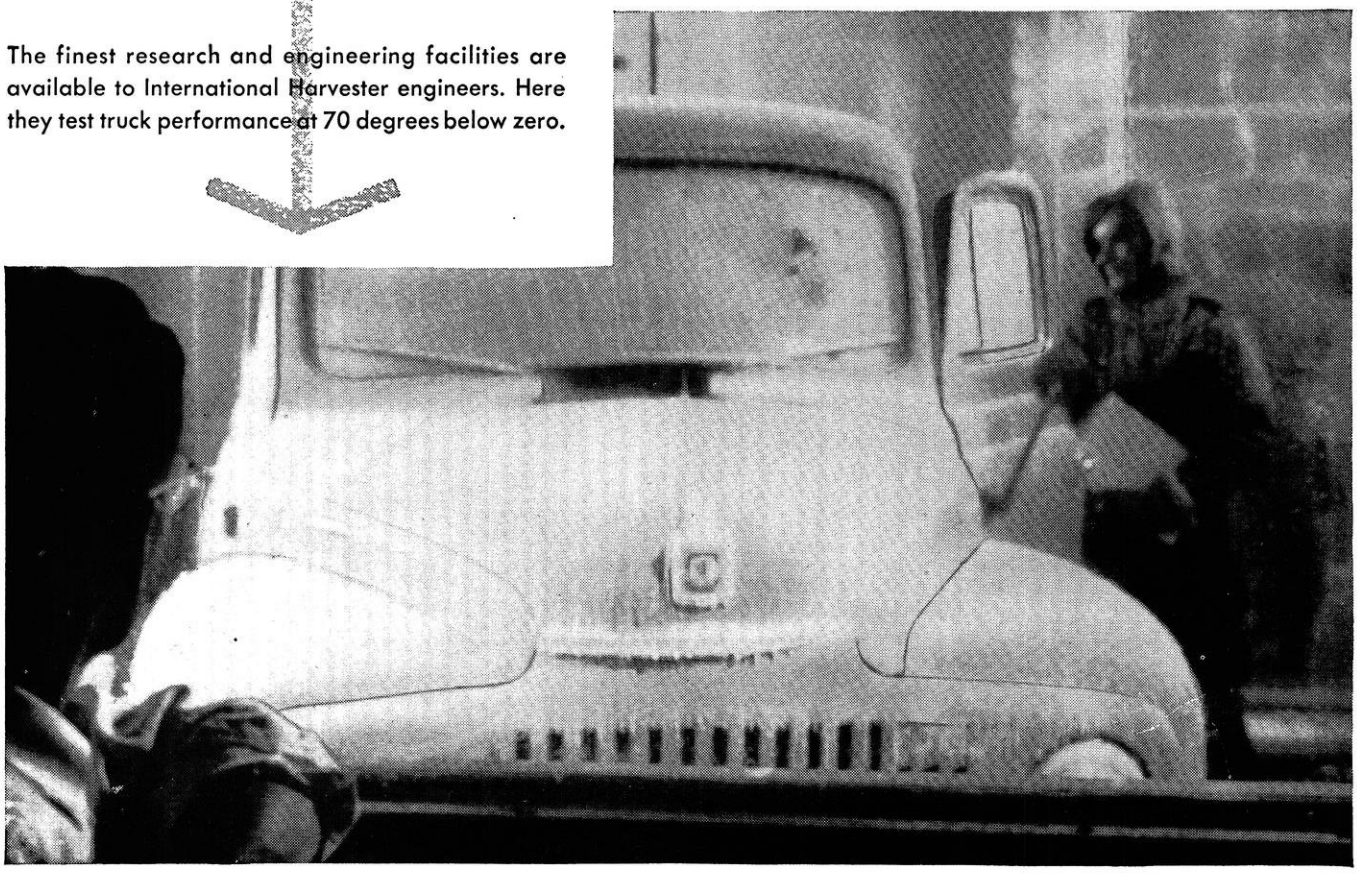


Section of 130-year-old cast iron water main still in service in Philadelphia, Pa.

CAST IRON PIPE SERVES FOR CENTURIES

Good climate for **engineering** jobs!

The finest research and engineering facilities are available to International Harvester engineers. Here they test truck performance at 70 degrees below zero.



■ The American transportation system is the most highly developed in the world. And International trucks are part of this picture.

At Fort Wayne, Indiana, International Harvester maintains the biggest truck research, development and testing laboratory in the world. The opportunity such an operation provides for young engineers is obvious.

Throughout the entire International Harvester operation, engineers are needed. Electrical, mechanical, industrial, metallurgical, agricultural, design, research, and testing engineers find that Harvester offers unusual opportunity.

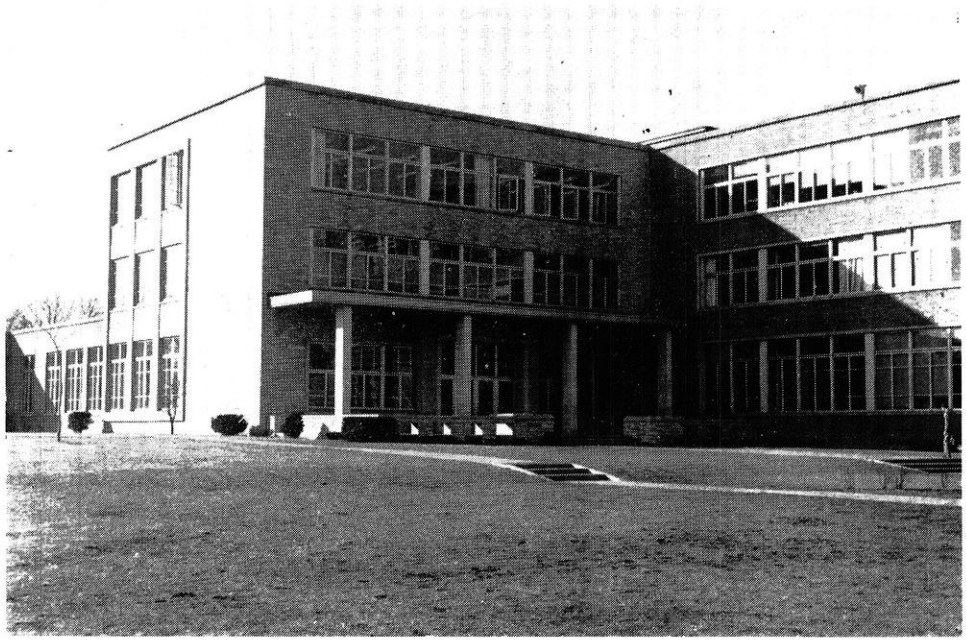
If you are interested in a career in the engineering field, we suggest you write to F. D. MacDonald, Education and Personnel Department, International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois.

INTERNATIONAL HARVESTER

Chicago 1, Illinois

Builders of Farm Implements and Farm Tractors for easier, more profitable farming . . . Trucks for better transport . . . Crawler and Industrial Tractors . . . Industrial power for road-building and earth-moving . . . Refrigeration for better preservation of food

HIGH SCHOOL SECTION



New Engineering Building

Each year the Engineering School of the University of Wisconsin and the "Wisconsin Engineer" Magazine devote a section of this publication to the high school seniors of Wisconsin. We do this in hopes that those of you who are interested in engineering, mathematics, or the sciences will seriously consider engineering when thinking of your college course for next fall. Choice of jobs is very good and salaries high today due to the small graduating classes in the past few years and the ever increasing demand for engineers.

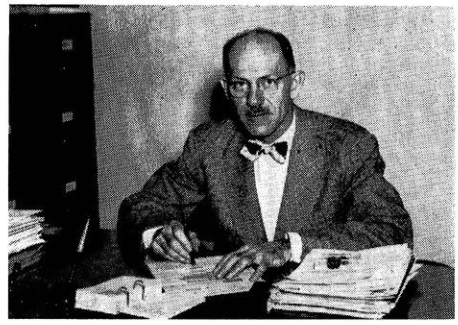
If you have questions, write Dean, College of Engineering, Mechanical Engineering Building, Madison, Wisconsin.

The Engineer and His Job

by Dean Kurt F. Wendt

College of Engineering

Rarely a day passes without a letter or a call from some young man or sometimes a young lady asking: What is engineering? What does the engineer do? Should I be an engineer?



DEAN WENDT

Webster defines engineering as the art and science by which the properties of matter and the sources of power in nature are made useful to man in structures, machines, and manufactured products. The adaptation of materials found in nature into useful forms, and the harnessing and conversion of natural forces into useful power by efficient and economical means are truly creative contributions of engineering.

The profession is divided into five major fields: chemical, civil, electrical, mechanical, and mining and metallurgical engineering, each with many subdivisions.

Manufacturing or processing of substances from raw materials through carefully controlled chemical and physical changes comprise the principal field of chemical engineering. The primary subdivisions are: (1) unit operations, including such physical problems as transportation of fluids and solids, heat transfer, absorption of gases, evaporation, drying, distillation and filtration; (2) unit processes which involve making changes through chemical reactions such as oxidation, chlorination, and polymerization; and (3) process control and instrumentation. About 80 per cent of the chemical engineers are engaged in manufacturing.

Civil engineering is the oldest branch and at one time included all engineering of a non-military character. The main subdivisions are structural, sanitary, hydraulic, and transportation engineering. Our great buildings, bridges, dams and tunnels are designed and erected by the structural engineer. Water supply systems and sewage disposal systems are the primary concern of the sanitary engineer. The control and transportation of water for power, irrigation, flood control, and water supply are in the field of hydraulics. The transportation engineer supplies the roadways and the terminal facilities, including the traffic control systems for automobiles, buses, trucks, railroads, and aircraft.

Electrical engineering has two main divisions: the generation, transportation, and application of electrical energy, which is commonly called power engineering; and the great field of communications and electronics which includes telegraph, telephone, radio, radar, and television. The electrical engineer is responsible for furnishing much of the power used in industry; for lighting our homes, streets, and plants; for the design of innumerable labor-saving devices found in homes, business, and industry; for much of the control equipment of modern industry; for medical equipment such as X-rays; and for such interesting developments as the new electronic computers which can solve problems in a matter of minutes that would require the work of months by conventional computing methods.

The mechanical engineer deals chiefly with the design and construction of machines for the generation or transformation of power, and for the production of other machines. Power generation, particularly steam power, internal combustion engines, tools and machinery, heating, ventilating, refrigeration and industrial planning are some common subdivisions within the field. Obviously it is essential that the mechanical engineer cooperate with chemical, civil, electrical, and metallurgical engineers in working out solutions to the problems in this broad area of work.

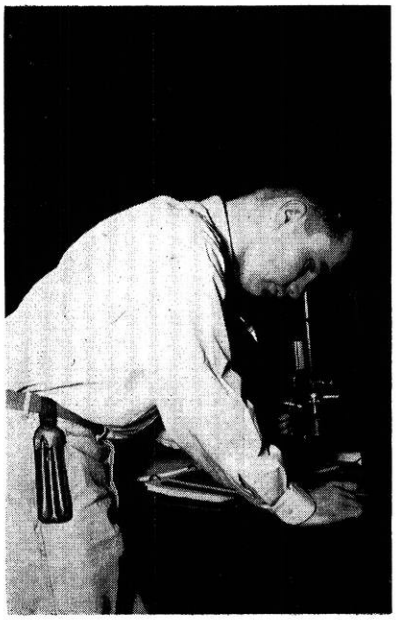
The metallurgical engineer is concerned with the extraction of metals from their ores and in the subsequent refining and combination of metals to produce alloys possessing special properties.

The mining engineer searches for and extracts all classes of minerals from the earth. The field naturally divides itself into three parts: mining geology, concerned with discovery and exploration; mining engineering proper, involving design, construction and operation of plants for the recovery of ore from the earth; and mineral dressing, dealing with the development and operation of processes for separation of the valuable minerals from associated wastes.

The functional divisions of engineering are: administration, planning and design, sales and consulting, construction and installation, production and operation, research and development, and teaching. Most people are surprised to learn that nearly one-third of all engineers rise to administrative positions where their primary task is to direct the work of others. About 40 per cent of all

(*please turn to page* 54)

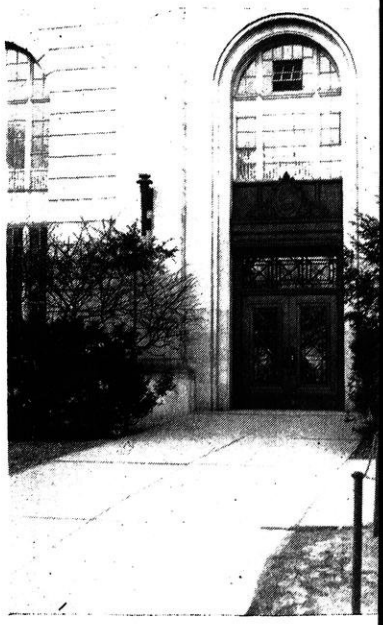
Our Engineering Campus

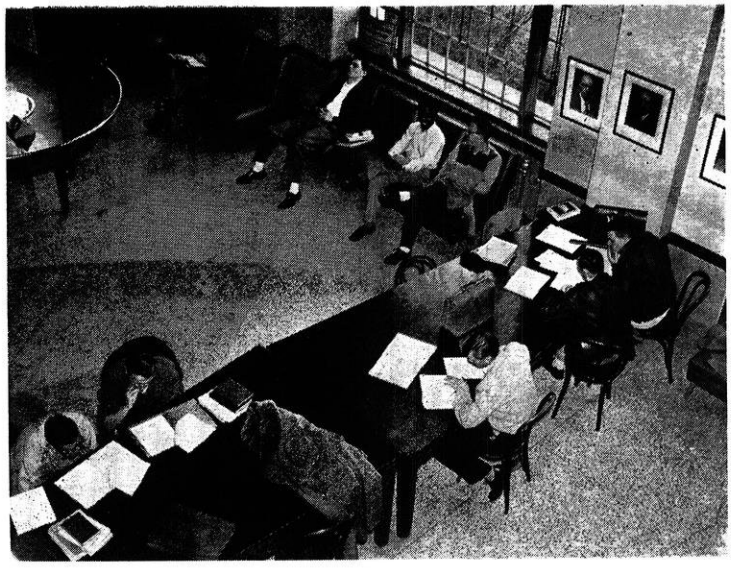


Left: Joe Stage, ME2, is shown studying an etched metal sample in the Mining and Metallurgy Department's Crystallography Lab.

Right: The front door of the Mechanical Engineering Building on University Avenue.

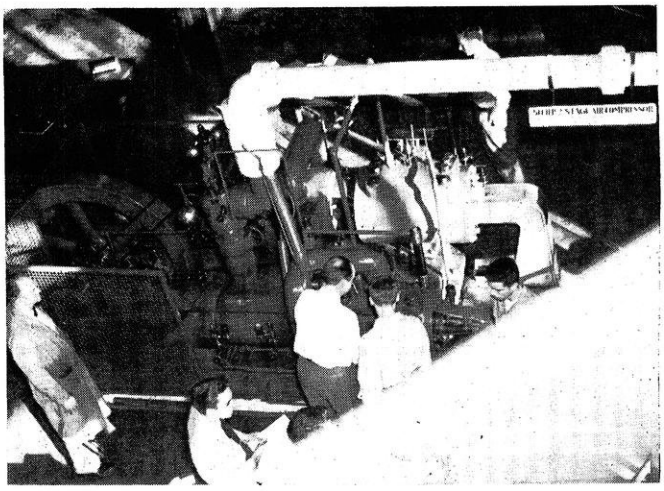
Below: The lobby of the M.E. building is a popular spot for engineering students to study or talk between classes.

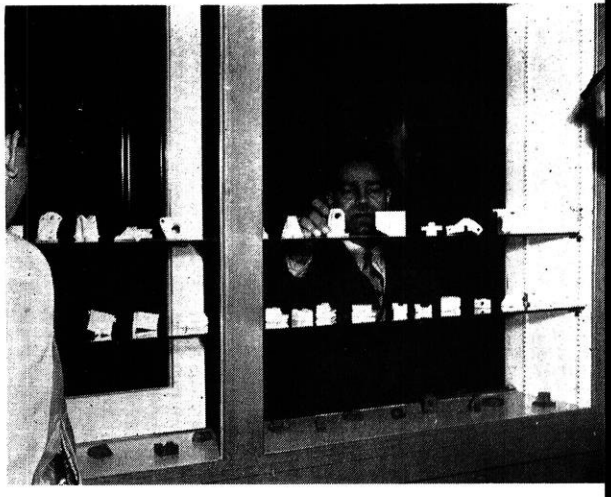




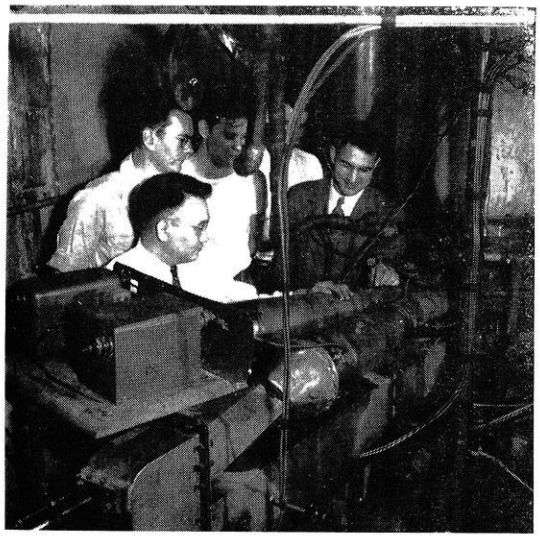
Below: Thermodynamics classes analyze the performance of many types of heat power devices like this air compressor.

Below: Mr. I. El-Sherbini of the drawing department is shown arranging models he made of soap, wood, and clay. He designed them to illustrate assignments of the drawing classes.



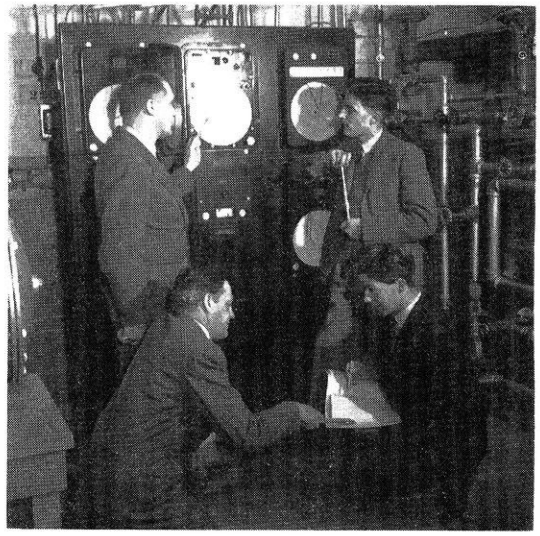


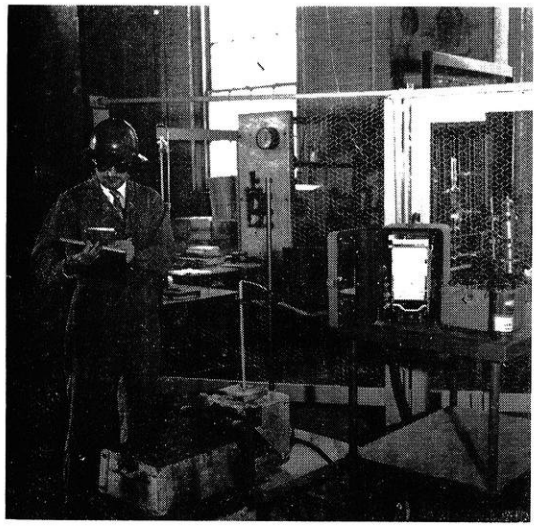
Graduate Student Research



Left: Otto Uyehara (left) and Phil Meyers (right), Mechanical Engineering Dept., supervise a turbo-jet project.

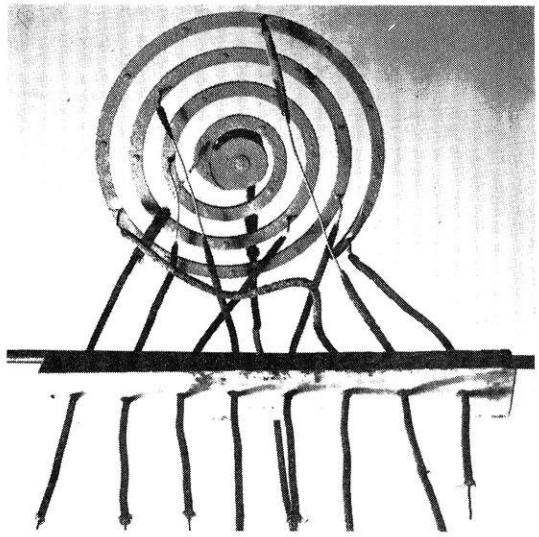
Right: Chemical Engineering Lab.

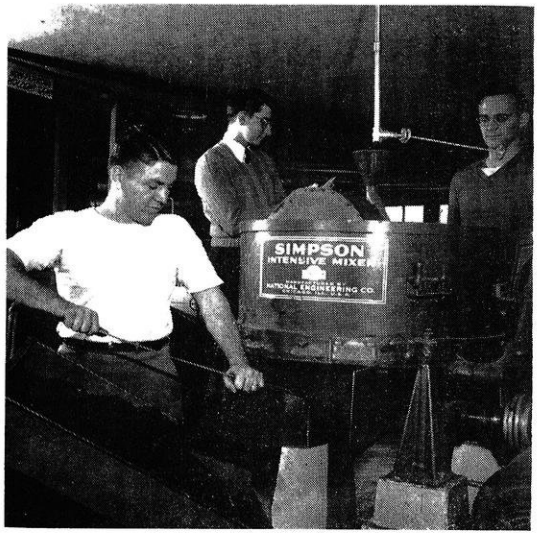




Left: Lew Porter, Metallurgist, measures the fluidity and rate of flow of cast iron.

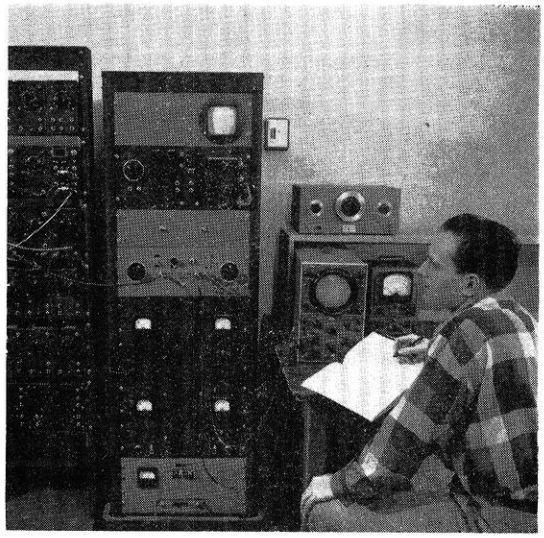
Right: The solidified iron, after a fluidity test.





Left: Mining & Metallurgy students preparing molds in the foundry.

Right: William Schultz, Electrical Engineer, with an analog computer built in the E.E. Labs.



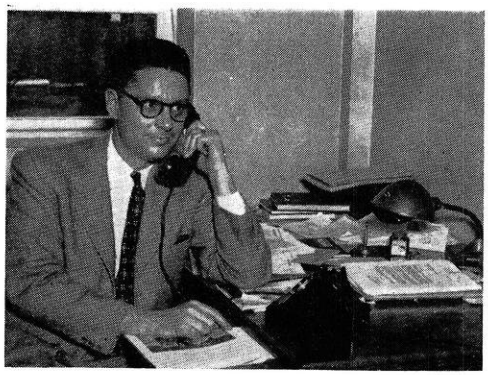
Experiment Station

Engineering Graduate Projects Coordinated by This Office

by W. R. Marshall, Jr.

Associate Director, Engineering Experiment Station

In the College of Engineering at Wisconsin, graduate research in engineering is carried on in the Departments of Chemical Engineering, Civil Engineering, Drawing, Electrical Engineering, Mechanical Engineering, Mechanics, and Metallurgical Engineering. The research problems which evolve in these departments stem from the research interests of the members of the professional staff. This is of vital importance not only to the proper training of the young men engaged in graduate research but to the successful prosecution of a research program. Only by working under a professor, who displays keen interest in a given field, can a graduate student receive the maximum benefit from and training in research. Thus, the objectives of research in the College of Engineering are to educate promising young men in research and in the advanced phases of their profession, and to develop new basic knowledge for future engineering applications.



DEAN MARSHALL

At the present time, there are over 200 individual investigations in the College of Engineering. These are supported by funds from the state, from industry, from the Wisconsin Alumni Research Foundation, and from the federal government. Virtually all of the research problems are staffed by graduate students working for advanced degrees, M.S. or Ph.D., under the guidance of a major professor. A majority of the graduate students doing research receive financial support. It appears to be generally true at most universities that a student who has the scholastic ability, the capacity, and the confidence to engage in graduate research can receive financial support for his entire period of graduate study. Certainly at Wisconsin the College of Engineering is fortunate in being able to offer financial support to qualified graduate students who do research for the M.S. or Ph.D. degree.

All of the research in the College of Engineering is coordinated under the Engineering Experiment Station which was authorized by the Board of Regents in 1914. It is composed of all members of the faculty who are engaged in research. It was reorganized in 1947, at which time legislative appropriations were secured for the first time. The Station has no separate buildings, no separate staff, no separate program—rather it exists administratively as a coordinating agency in the field of engineering research. Most of the graduate students in the college and all of the staff members of the several departments who are engaged in research constitute the Station staff, while the regular laboratories, graduate and undergraduate, in each department are the workshops in which research is carried on.

The objectives of the Engineering Experiment Station as formulated by the faculty when the Station was recognized and placed on the present basis are:

1) To promote engineering education by encouraging, fostering and conducting scientific investigations and industrial research; by training and developing persons for the conduct of such investigation and research; and by acquiring and disseminating knowledge in relation to industrial and engineering problems.
2) To render public service by cooperating with industries, manufacturers, and professional engineers in the solution of broad fundamental problems of general interest to these groups.
3) To provide professional opportunities to the teaching staff for full-time work in the Station in research and process development during an occasional semester's leave of absence or summer vacation.
4) To provide opportunities for cooperation among the different departments of the University on research projects which demand collaboration in several professional fields.
5) To provide special buildings or space for experimental projects which cannot be housed properly in any one department or which for reasons of safety, magnitude of project, and convenience should be detached from classrooms and undergraduate laboratories.

These objectives express the philosophies which underlie all Experiment Station operations. Research in any State supported University, to be defensible, must contribute significantly to the teaching program. The problems selected for study should be largely fundamental in character, suitable for graduate thesis work, and unrestricted as to disclosure of results. Implicit in the statement of functions are two facts:

1) The Station must not become a commercial testing laboratory for the conduct of routine tests, or generally engage in the solution of the trouble-shooting

(continued from page 38)

Employment Situation

by Henry G. Goehring

Assistant Dean and Job Placement Director

Mr. Goehring

Each year for the past several years the demand for engineers has been on the increase while the supply has been decreasing. It is now apparent that the demand for engineers is beginning to level off. Salaries for inexperienced engineers are becoming more stabilized but at a slightly higher figure than that offered during the spring of 1953. However the demand for engineers continues to exceed the supply and from all indications will continue to do so for the next several years.

Let us look first at the supply. In 1949 approximately 600 students were awarded Bachelor of Science degrees in Engineering at the University of Wisconsin; in 1950 there were 800 such awards; in 1951, approximately 555; in 1952, slightly more than 400; in 1953 about 330 and in 1954 there will be approximately 275. Present enrollment indicates a slight increase to approximately 335 in 1955. Similar conditions exist in engineering colleges throughout the country. Enrollment in the class entering in the fall of 1951 showed an increase over the preceding year and that of 1952 exceeded that of the previous year by approximately 50%. Enrollment in the fall of 1953 showed an increase of approximately 15% over 1952. The interest evidenced by high school seniors indicates a still greater increase in the fall of 1954. However it will be two years before a substantial increase is felt through larger graduating classes.

Looking at the demand, a survey conducted by the Manpower Committee of the American Society for Engineering Education shows that this country needs a minimum of 30,000 new engineers annually and that the total number graduated in 1953 was slightly over 22,000 and will be less than 20,000 in 1954. According to this study, the engineering profession needs 20,000 engineering graduates annually for civilian peacetime needs alone. In addition, the military needs must be added to civilian requirements.

What does this mean to the high school students about to select a college program? All young men to be graduated from high schools should carefully consider their capabilities in Mathematics and the Physical Sciences — their interests in these areas—and their over-all high school records. Those who have made above average records in these studies should give considerable thought to engineering as a profession in the light of the excellent long range opportunities presented.

To the college graduate it should mean an excellent opportunity to find out by personal consultation the variety of opportunities available. Companies from all industries are sending representatives to the campus. During the first semester of the 1953-54 year 263 companies sent representatives to talk to approximately 100 mid-year graduates. Approximately 300 companies will be represented on the campus during the current semester. Here is an opportunity for the graduating engineer to learn about employment possibilities in practically any field.

Although many seniors are expecting to enter the armed services shortly after graduation, it is emphasized that the great majority of companies will offer employment regardless of the imminence of induction. Men so employed are granted military leave and their employment continues unbroken during this period. Even though induction into the armed services immediately follows graduation, the opportunity to establish contacts is available right on the campus. Such contacts can be renewed upon separation from the service much more easily than new contacts can be made.

Opportunities for summer employment are available in many sections of the country. Some of this work is correlated directly with training programs for the graduate and students electing these opportunities will gain worth while experience and receive good remuneration for their efforts. Other companies offer shop experience which provides an excellent background for engineering work in the future. Information on engineering opportunities including summer employment is available in the Engineering Placement Office, Room 261, Mechanical Engineering Building.

END

A Friend in Need

by Prof. K. G. Shiels

MARY R. O'KEEFE and PROF. K. G. SHIELS
Freshman Engineering Advisers

22 T24 may sound like a football signal, but in reality it is room 22 of Temporary 24 building, the freshman engineering advisor office. When freshmen engineers report for Freshman Period at the University of Wisconsin next September, they will find that their advisor office, which is conviently located in the same building as their engineering drawing classes, has been anticipating the students' arrival with considerable interest. Their high school records have been examined.

The advisor office tells all prospective engineers to review their algebra briefly during the summer before their freshman year so as to be ready for the mathematics placement examination to be given the first day of Freshman Period. In following the schedule arranged by the registrar for Freshman Period week, freshmen with the need for special counsel may be called aside for individual conference before their program of studies is finally set up, or those with four units of high school mathematics and high achievement in the placement test may be called aside for group conference. The week of Freshman Period itself will clarify many questions paramount in the minds of students. Group meetings with their dean and with their freshman advisor will be helpful and enlightening.

Finally classes begin and the engineering student immediately realizes that the advice he has received to apply himself diligently to his studies and to organization of his time and efforts is sound. We might say that it is at this point the real work of the Freshman Advisor Office begins. Perhaps the student wishes further conference, or questions occur to him on topics which might range from difficulty in a subject, financial problems, the need of a reduction in schedule due to the necessity of outside work for support, or just for the need of a friendly visit.

The Freshman Advisor Office is sincerely interested in each individual student and in making their brief visit with you now while you are still in high school; we would like you to know that no question of a freshman engineer is too trivial to be given consideration and thought. We are looking forward to meeting you next September and to having your assistance in allowing us to know you and to try to help you with your problems. We welcome prospective engineering students to the College of Engineering of the University of Wisconsin.

END

Experiment Station - -

(continued from page 35)

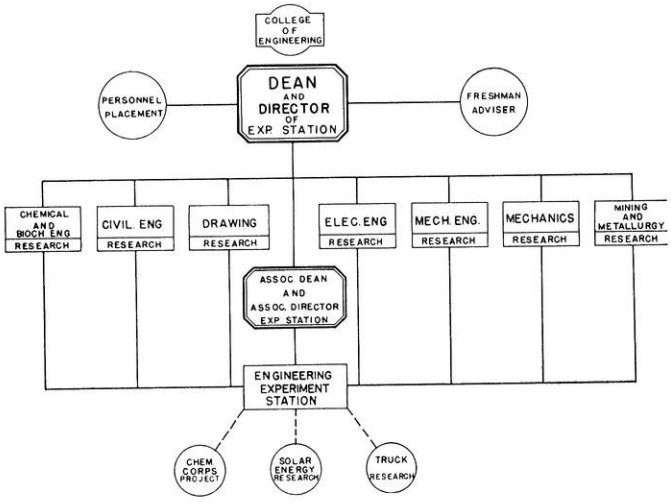
type of problem, and

2) It shall not offer a consulting service to compete unfairly with the professional engineer.

Without performing either of these functions the Station can still render an important and valuable service to industry, and at the same time meet its primary objectives of training students and promoting engineering education.

The Engineering Experiment Station fits into the overall university organization as follows: The Board of Regents is the policy-making, appointing, and contracting body of the University. The President is the administrative head, reporting to the Board. The Dean of the College of Engineering reports to the President and is the legal Director of the Engineering Experiment Station, while the Associate Director is in executive charge.

The Associate Director negotiates contracts for research and fellowships through the Vice-President of Business and Finance, authorizes purchases of supplies and equipment, helps to staff projects, takes care of payrolls, and generally assists all interested college personnel in initiating and operating research studies. The relationship of the Experiment Station to the research help of the departments of the College is shown in the organization chart in Figure 1.



Layout of the directors of the College of Engineering.

Wisconsin Alumni Research Foundation support may be direct to a faculty member without clearance of any sort. Experiment Station support is always cleared, initially at least, with the Department concerned and most often, the support is jointly by Department and Station. Certain special projects are outside of any department, or involve many departments, as shown in the three boxes at the bottom of Figure 1. In such cases it is possible to set up an advisory committee for the project as was done for the Truck Research and is currently being done for solar energy research. Individual cases require individual treatment. However, even in the case of these special projects, graduate students work on phases of these problems for advanced degrees. Therefore, the educational aspects of each project must be significant to provide the required training of students.

Admission to the graduate school in engineering is granted to University of Wisconsin graduates with a grade point average of 1.75 or above, and to out-of-state students with an undergraduate record equivalent to a grade point average of 2.25 or above. During the first year of graduate study, it is customary for a student to devote about three fourths of this time to advanced, graduate courses and one-fourth to independent study. The latter, in some cases, may occupy one-half of the students time. Twelve credits of combined course work and research constitute a full load during the first year of graduate work. To the undergraduate accustomed to carrying nineteen to twenty-one credits, this may appear to be a light load. Actually, its real implication is the fact that graduate work demands a large amount of independent effort from the student and hence the course credit load does not reflect the study required during the hours outside of formal class hours. In order for a graduate student to mature and attain the high professional level expected from him in his graduate studies, he must devote many hours to independent reading, study, and contemplation of the basic principles underlying his professional field. Such hours are not available with the heavy course loads in undergraduate study, so that graduate work is virtually imperative for the student who desires to achieve advanced professional development and training prior to entering industry.

The terminal degrees in graduate work may be either the M.S. or Ph.D. The former may be attained with a minimum of research, while the latter is a degree which is achieved strictly by virtue of excellence in research. Considerable time and effort is expended by each departmental staff in evaluating Ph.D. candidates to ensure their fitness for this endeavor. Since the average total cost, not including overhead, for training each Ph.D. candidate averages around $6,000, it is obviously of considerable importance to be sure of the competency of each individual seeking this degree.

The research results of the hundreds of problems studied in the College of Engineering during the past forty years have contributed materially to our nation's wealth of scientific knowledge. In keeping with the changing technological needs of the world, the research in the Experiment Station shows a changing pattern over the years to meet the new demands, as well as to point the way along new paths where industries' demands for new scientific data are not yet heavy. Thus, in Chemical Engineering we find research under way on chemical reaction kinetics, thermodynamics, biochemical engineering processes, basic studies of heat and mass transfer, and atomization processes. The results of these studies have led to new and improved design procedures in the chemical industries and have attracted to Wisconsin outstanding students from all over the world, who desire to do gradu-

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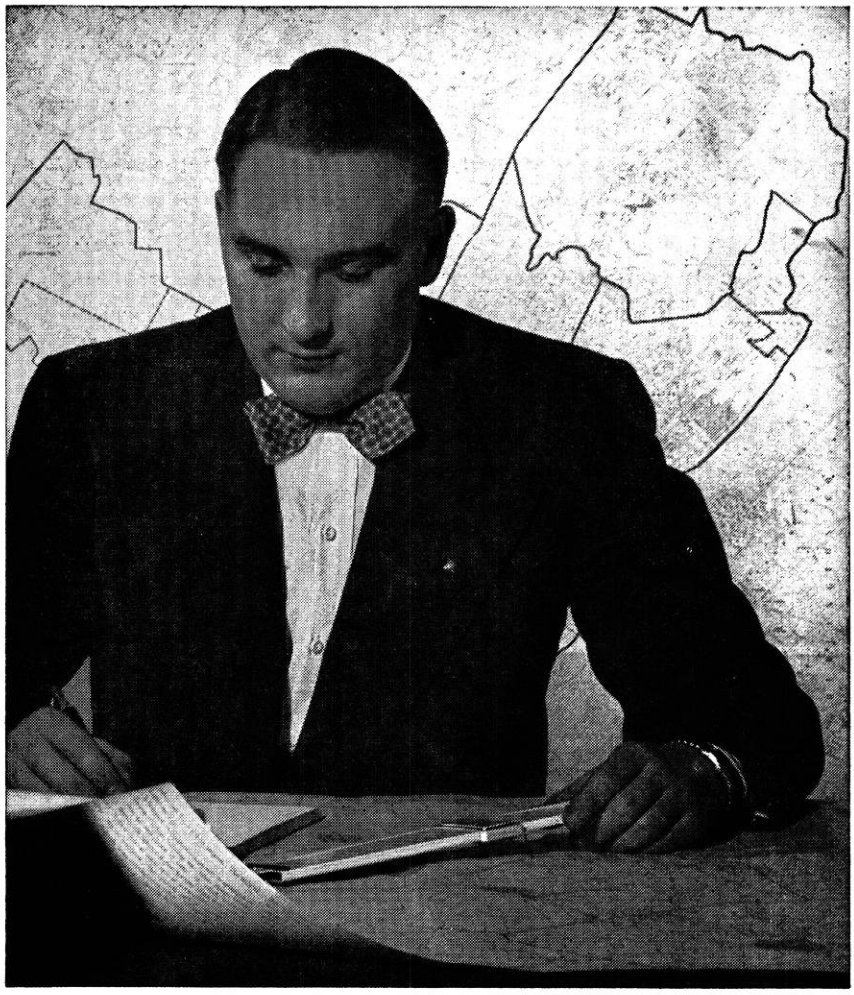
A Second Education



What makes a job hold its interest? After working for three years, Wylie Borum, E. E., '50, tells us what has kept his interest alive.

(*Reading time:* 38 seconds)

He graduated from the University of Pennsylvania in 1950, but Wylie Borum's education still hasn't ended. His job, he explains, has become his second education. And this continuing process of learning has kept his job interesting.

Wylie's first year at Bell Telephone Company of Pennsylvania was spent as a student engineer, which he feels was not only educational but extremely worth while. For it was while he took this course that he glimpsed the complexity of the business in considerable detail. He worked in all departments – ran switchboards, climbed poles and even did a stint in the Accounting Department.

Wylie discovered that there were many spots in the telephone organization for engineers besides the General Engineering Department. Even in Accounting – which today is highly mechanized with things like Centralized Automatic Message Accounting Machines.

Training finished, Wylie was assigned to the Manual Equipment Section of the General Engineering Department. His education continued. He found out, he reports, that the dollar is an important part of engineering. In writing equipment specifications, he had to be sure of reasonable cost as well as efficient operation. There's a big difference, he discovered, in doing a theoretical job in school and doing a job in which costs are an important consideration.

Now Wylie has been promoted to the Plant Extension Engineering Group and still is learning. His present job is co-ordinating plans for replacing the last manual central office in Philadelphia with a dial system. The cost will be approximately $1,500,000.

It's a big responsibility. But the Telephone Company puts capable young men on their own quickly.

• • •

Wylie Borum's job is with an operating company of the Bell System. But there are also job opportunities for engineers in Bell Telephone Laboratories, Western Electric, and Sandia Corporation.

BELL TELEPHONE SYSTEM

(continued from page 27)
scribe to membership in the Wisconsin Taxpayers' Alliance for the legislative year of 1955 specifically indicating the desire to secure weekly schedules of bills that will be considered by the legislature the following week.

Respectively submitted,
Willard W. Warzyn, Chmn.
Legislative Committee

SPEAKERS

As at any major convention, one of the most significant parts at the WSPE meeting was played by the group of guest speakers. Your society was justifiably proud in having attracted men of such high calibre as Anthony von Wening, chairman of the finance committee of the A. O. Smith Corp.; Dr. J. O. Christianson, superintendent of the School of Agriculture, University

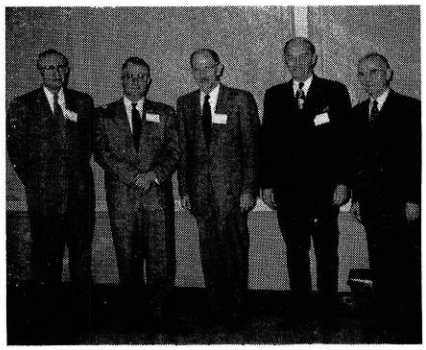
Functional Group Meeting Leaders — Robert W. Smeaton, John Gammell, Eugene W. Odbert, and Carl E. Mohs.

of Minnesota; Joseph J. Weiler, president of the Wisconsin Architects Association; Morton O. Withey, emeritus dean of the College of Engineering, University of Wisconsin; William E. Crawford, chairman of engineering division of the Wisconsin Registration Board of Architects and Professional Engineers; Kurt F. Wendt, dean of College of Engineering, University of Wisconsin; and Charlie Grimm, manager of the Milwaukee Braves. Though the subject varied widely, the speeches were uniformly well received.

Mr. von Wening spoke Friday afternoon on "Money." He urged the society members to "have faith" in this country's economy and to avoid "talking depression," citing the recent announcement by the president of General Motors Corp. relating to their tremendous expansion program as evidence of the faith that this organization has in our economic system. "Your money," he declared, "isn't any better than the faith you have in it. And your country isn't any better than the faith you place in it." He warned against further inflation, which he said has contributed to the downfall of many countries in the past.

"Americanism" was discussed by Dr. Christiansin, including the importance of the individual in strenthening and promoting the continuation of America's free enterprise system. He pointed out that the things responsible for America's greatness were moral stability, schools and churches, home life, ownership of property and freedom of expression. Since only five out of every hundred world leaders being born now are North Americans, it behooves us to give these five the best training possible without regard to their social, economic, religious or color status. According to Dr. Christianson, the world is becoming smaller because of advances in communication and transportation and the affairs of the rest of the world are much more important to us than they were in the recent past. He also pointed out that our spiritual development must parallel our material developments. Also at the Friday evening banquet, Frederick Agthe was honored during presentation of awards ceremonies.

The first speaker at the Saturday morning session was Mr. Weiler who presented the problem "Building Design—Architect or Engineer?" He stated that his prime objective was "to help bring about a better understanding of architects to the professional engineers" and that it was his sincere hope that the two groups could cooperate on all of their mutual problems to the conclusion that both groups would benefit. "An architect is primarily interested in building planning, coordination, and artistry. An engineer through his training is more nearly interested in the physical sciences and materials. Both have their contribution to make."



General Session Speakers — George P. Steinmetz, presiding; Joseph J. Weiler, Dean Kurt F. Wendt, Emeritus Dean M. O. Withey, and William E. Crawford.

"How Can We Improve the Status of the Engineer" was the subject of Emeritus Dean Withey. He emphasized that an increased sense of ethics in his work was necessary to maintain and advance the young engineer along a professional level. "The essential principles in all of these codes of ethics and professional conduct are well summarized in the golden rule, but the applications of these principles are not always apparent, especially under circumstances which are not familiar to the engineer concerned."

Speaking of the need for more adequate financial recognition for engineers, Mr. Withey pointed out that while salaries of graduate engineers on the first assignments may seem excessive compared to salaries prevalent 15 or 20 years ago, these salaries now offered have about the same purchasing power as those of the aforesaid period. "When consideration is made of the low value of the dollar and the wages being

(please turn to page 42)

Brig. General David Sarnoff, Chairman of the Board, Radio Corporation of America

Sees No. 1 wish come true!

Television Tape Recording by RCA Opens New Era of Electronic Photography

In 1956, RCA's General Sarnoff will celebrate his 50th year in the field of radio. Looking ahead to that occasion, three years ago, he asked his family of scientists and researchers for three gifts to mark that anniversary: (1) A television tape recorder, (2) An electronic air conditioner, (3) A true amplifier of light.

Gift No. 1—the video tape recorder—has already been successfully demonstrated, two years ahead of time! Both color and black-and-white TV pictures were instantly recorded without any photographic development or processing.

You can imagine the future importance of this development to television broadcasting, to motion pictures, education, industry and national defense. And you can see its entertainment value to you, in your own home. There the tape equipment could be used for home movies, and—by connecting it to your television set—you could make personal recordings of your favorite TV programs.

Expressing his gratitude for this "gift," Gen. Sarnoff said it was only a matter of time, perhaps two years, before the finishing touches would bring this recording system to commercial reality. He described it as the first major step into an era of "electronic photography."

Such achievements as this, stemming from continuous pioneering in research and engineering, make "RCA" an emblem of quality, dependability and progress.

INTRIGUING OPPORTUNITIES FOR GRADUATING ENGINEERS

You're sure to find the exact type of challenge *you* want in Engineering Development, Design, or Manufacturing at RCA. Men with Bachelor's, Master's or Doctor's degrees in EE, ME, IE or Physics are needed. *You'll find your optimum career work* among the hundreds of products RCA produces for the home, science, industry and Government.

If you have the necessary education and experience, you will be considered for a direct engineering assignment. Otherwise, you'll participate in our Specialized Training Program, in which you can explore RCA's many interesting engineering operations for a full year.

Your rapid professional advancement is enhanced at RCA by the free flow of engineering information.

Write today to: College Relations, RCA Victor, Camden, New Jersey. Or, see your Placement Director.

RADIO CORPORATION OF AMERICA

World leader in radio—first in television

(continued from page 40)
paid to skilled and unskilled persons with limited educational background, it appears that our WSPE suggested schedule of minimum entrance salaries is still too low, and that both schedules of governmental salaries are much too low, especially in the medium and higher grades. He also stressed the need for a single professional engineering society and the present attitude of engineers toward collective bargaining.

The final conference meeting was held at a Saturday afternoon luncheon, where our society was favored by remarks from the inimitable Charlie Grimm, manager of the Milwaukee Braves. He was unwilling to predict a pennant for the Braves although he was obviously quite enthusiastic about the team's chances. "Jolly Cholly" reminded us of Governor Kohler's remarks a year ago when he suggested that the team should be called the Wisconsin Braves, and implied that maybe the governor was right when you consider all the special trains and busses that pulled into the stadium at every game. Questions from the floor produced the answers that if anyone could break Babe Ruth's home run record, it would be Eddie Mathews, and that if they traded Spahn, Grimm would have to be a part of the deal.

•

NOMINATING COMMITTEE

Four members of the nominating committee, Walter Peirce, S. S. Cohen, D. W. Nelson, and L. H. Stark, met in Milwaukee on Jan. 16 to poll the ballot cast by the members of WSPE for officers and directors selected by the committee on Oct. 17, 1953 to serve for the administrative term beginning July 1, 1954.

The result of the ballot is as follows:

Total votes cast	452
Pres.—George Steinmetz	451
1st V.P.—Albert Owen Ayres	447
2nd V.P.—Arthur Behling	448
Sec.—Eldon C. Wagner	450
Treas.—Willard Cottingham	451
Director—James Bambery	442
Director—Ray Behrens	442
Nat. Rep.—Ed Kallevang	446
Nat. Rep.—Harold Trester	441

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FUNCTIONAL GROUP MEETINGS

Four individual group meetings were held Friday morning, respectively considering the position of engineers in public employment, Eugene Odbert presiding; consulting work, Carl Mohs in charge; education, John Gammell leading the discussion; and in private industry, with Robert Smeaton at the head of the table.

The agenda of each group stressed ways of interesting engineers in

their branch, ways to establish more satisfactory ethics in engineering, personal responsibility to the public, and methods of establishing greater professional consciousness among all engineers and undergraduate engineering students.

Preceding these group meetings, Pierce Ellis, president of the state chapter, presided over a brief "Kick Off" meeting.

•

MEMBERSHIP COMMITTEE

Mr. Frank Carlson, present chairman of the committee, presented the membership report. Although only 26% of the quota for new members has thus far been reached with 58% of the alloted time elapsed, he felt the harvest of initiates should be rich in the next few months. Most of the mailing pieces have been sent out to prospects and followup has been arranged for by chapter chairmen, so that the next group of new members should be substantially greater than the forty-eight received at the Milwaukee meeting.

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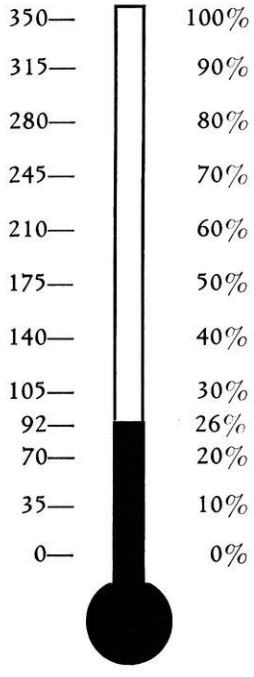


MEMBERSHIP

Chapter	Member & Affiliates 7/1/53	Quota	New Members	% Quota
W is 1st	55	10	8	80%
WV is 2nd	41	15	8	53%
NW is 3rd	51	17	6	35%
FRV is 4th	117	41	14	34%
SW is 5th	199	53	16	30%
SE is 6th	64	41	8	19%
M is 7th	342	141	26	18%
Out of state is 8th	45	32	4	12%
	914	350	92	26%

48 NEW MEMBERS ADDED AT JANUARY 28, 1954 BOARD MEETING

New Members	Sponsored by
Milwaukee	
Deane W. True	Pierce G. Ellis
William J. Herziger	*John K. Primm
Foster C. Koehn	*Kurt Roth
Gilbert F. Eichfeld	John Gammell
Lawrence S. Krueger	George A. Sievers
Edison C. Freshwaters	John Gammell
Loerwood C. Wasson	Orrin E. Andrus
Arthur H. Graettinger	George Sievers
Betram H. Puerner	*Guy V. Woody
Raymond Litka (E-I-T)	*Robert Hopwood
Paul R. Goudy	John Gammell
Arthur C. Flamme	*Chester Kennedy
Northwest	
Edward W. Deterling	W. Baumgartner
Clinton T. Knox	W. Baumgartner
Southeast	
Dwight A. Francis	R. R. Gocht
M. A. von Berlichingen	*L. E. Dick
Vitas T. Thomas	R. R. Gocht
Victor Svec	R. R. Gocht
Rudolph V. Ferraro (E-I-T)	R. R. Gocht
Southwest	
Joseph R. Sutton	*L. J. Busby
Morton A. Newcomb	Page A. Johnson
Delos E. Dudley	*Herbert O. Lord
Waldemar J. Landwehr	*Herbert O. Lord
Harry D. Blake	*Zenno Gorder
Arthur L. Steinhaus	Page A. Johnson
John W. Schutt	Page A. Johnson
James A. Jarvis	Page A. Johnson
Chester H. Hartel	Page A. Johnson
Edward C. Helmke	*James A. Gage
Richard F. Woroch	*A. F. Ahearn

(*please turn to page* 48)

*Listed as sponsors for the first time in January 1954.

Sanitary Engineering - -

(*continued from page* 20)

value. While sanitary engineering covers a broad field of engineering relating to the betterment and control of environmental factors affecting the public health, the more specific work of the sanitary engineer in a private engineering organization offers sufficient scope for this discussion.

The engineering work of an organization such as the one of which I am a partner has to do primarily with investigations and reports, plans and specifications, supervision of construction, and operation of waterworks, sewage works, industrial wastes disposal, drainage, garbage, and refuse disposal. Each individual project is administered by a partner with a project engineer in responsible charge. Usually the project engineer is a professional sanitary engineer.

For investigations and reports, the field work may involve surveys, gaging, sampling, testing, and design and operation of pilot plants. The field men may include rodmen, transitmen, party chiefs, assistant engineers, and chemists. The reports are compiled by the project engineer with the help of assistant engineers. The young sanitary engineer should be capable of handling the job of party chief, assistant engineer, or chemist, the latter operating under the supervision of a chief chemist.

The preparation of plans and specifications on a project proceed under the direction of the project engineer. Functional drawings are made by the engineers and assistant engineers who are normally young sanitary engineers. Most modern sanitary engineering works are so complex that the design then proceeds through office departments which include structural, architectural, mechanical and electrical. Each department is headed by a senior engineer or architect and includes the designers, detailers, draftsmen, and tracers. No one in these categories needs to be a sanitary engineer, but drafting ability will be helpful to a young sanitary engineer both to securing a job and to retain steady employment.

A detailed quantity estimate is usually required as a basis for estimates of cost and the young sanitary engineer can be useful and at the same time learn much about the functional details of the design while on such work.

Specifications and contract documents are normally prepared by the specifications engineer assisted by the senior engineers and project engineers. The young sanitary engineer must learn requirements for preparation of specifications and contract documents and usually learns by assisting either the project or the specifications engineer.

In the construction of a project, the professional sanitary engineer may furnish field parties to supply lines and grades, inspectors and resident engineers. It is very worthwhile for a graduate sanitary engineer to spend some time in the field as an inspector or resident engineer.

Frequently, the professional sanitary engineer has the responsibility for operation of a sewage treatment plant or water purification plant during the first year or two of

operation. The young graduate sanitary engineer would be very fortunate to secure the experience of operating either type of plant under the supervision of the professional engineer.

A combination of expereience during the early years following the graduation of a sanitary engineer from college which includes investigations and reports, preparation of functional drawings, detailed estimates of cost, preparation of specifications and contract documents, inspection of construction and operation of plants should be ideal background toward the ultimate development of a professional sanitary engineer.

Continued employment and advancement of the young sanitary engineer depend upon character, ability, and opportunity.

The sanitary engineering profession is still rapidly growing and developing. At no time are there complete up-to-date textbooks. In order to be properly informed, it is essential to a sanitary engineer to read the technical literature in his field, attend society meetings, study the data furnished by manufacturers, and inspect works that have been built.

Bound volumes of magazines are available in most large engineering offices and in other engineering libraries maintained by the universities and societies. However, the writer has found it extremely valuable to maintain a reference file of material relating to the particular field in which he is engaged, to clip most of his personal technical magazines, and file the articles according to subject matter. Since the writer has specialized in the field of sewage disposal, his personal file is predominantly on this subject.

The professional sanitary engineer should take an active part in engineering societies. The ASCE and a number of regional engineering societies, such as the BSCE have active sanitary engineering divisions. The water, sewage, and industrial wastes associations are supported to a considerable degree by sanitary engineers and the meetings and journals present much material of factual interest to them. The young sanitary engineer should himself contribute to the professional meetings and technical press by means of articles and discussions.

Much of the work of the sanitary engineer must be done with public funds. The sanitary engineer is required to meet the public and deal with public officials. He should become well acquainted with the operations of municipal, state, and federal agencies and inform himself as to the codes, rules, and regulations under which his work must be performed.

The professional sanitary engineer engaged in public work must work with politicians but apart from politics. It is generally recognized by those holding either elective or appointive offices that the sanitary engineer provides professional services essential to the public welfare and usually his work is carried on without the interference of politics or politicians. Occasionally a sanitary engineer who has served professionally under one administration finds himself persona-non-grata when a new administration takes over. This may be regardless of whether a change in political parties is involved and whether or not his services have been entirely satisfactory.

Activities in the sanitary engineering profession have been greatly speeded up during recent years, primarily because of the water pollution abatement program which has advanced on a nationwide scale. A secondary reason for increased activites in recent years is the large backlog of work to be done which had been delayed by depression and war conditions. While a large amount of work has been done in the abatement of pollution by provision for treatment of sewage and industrial wastes, the work yet to be done will require a constantly expanding force of workers in the sanitary engineering field.

A particular problem in pollution abatement is practically never completely and finally solved. Most municipal and industrial treatment works are designed for partial treatment of a portion of the wastes and for a limited capacity not greatly in excess of that required at the time of the design. Works become obsolete, uneconomical to operate, unable to provide the required degree of treatment, overloaded, or run down to an extent that major changes and additions are required periodically.

There is still a tremendous problem in the treatment of industrial wastes so as to abate pollution of the receiving waters.

To the writer, one of the most attractive features of the sanitary engineering profession is the variety and scope of the work involved. Practically every problem that arises has some phase that is new and different from previous problems. It is rarely practical to copy directly or follow previous work.

In addition to the technical education, there are other more general qualifications which are of great importance if the young sanitary engineer is to develop into a leader in the profession. These qualifications may include the following: The development of strong moral and ethical sense; a due sense of responsibility; broad social, political, and economic understanding; a liking for and a willingness to work with people, regardless of race, creed, or color; an appreciation of the importance of the work engaged upon; and a certain amount of drive and ambition, tempered by a proper regard for the rights and feelings of others.

Vice-Admiral John J. Manning, in an address to the Student Chapter Conference of the ASCE in Washington in the spring of 1950, advised the young engineer to enter into the field of usefulness and influence in his community, to recognize that his fellow men can offer him as much as he can offer them, and suggested that humility offers a faster road to success than pride and intolerance.

The fullest possible development of the professional sanitary engineer and the depth of satisfaction he will get out of life will depend as much upon his broad development as upon his technical advancement.

END

Experiment Station - -

(continued from page 38)

ate study in this field. In Civil Engineering, research has contributed to a better understanding the of hydrodynamics of the flow of rivers and their control; to the improvement in the design and construction of roads; and to the basic principles of waste disposal and the development of new sewage disposal methods. Research in Electrical Engineering is currently directed along many paths. Much attention is being given to the development of high speed electronic computing machines; the physics of the solid state is being applied to the development of transistors and semiconductors; theoretical analyses of power transmission problems are leading to more accurate design procedures; and the fundamentals of television and other signal transmission problems are receiving concerted research attention. In Mechanical Engineering, members of the staff, expert in engine instrumentation, are training graduate students in research on the difficult problems of temperature measurement in internal combustion engines; on the problems associated with fuel combustion in these engines; and on the flow phenomenon in jet engines. Other staff members working in the field of heat transmission are training graduate students in problems dealing with convective heat transfer, and thermal conduction. A new and exciting problem in Mechanical Engineering concerns the development of a solar engine to harness a small fraction of the sun's energy. Other research deals with lubrication studies, air flow related to air conditioning, and problems of machine design. The Department of Mechanics has achieved national prominence for its research on concrete and the development of important design data on this material. Studies in soil mechanics have contributed to new and improved building and road construction. In Mining and Metallurgy, research on the possibility of obtaining iron from low grade ore is significant to our nation's economy. Metallurgical studies on improving the processes for making castings, on the structure and properties of alloys, and the fundamental nature of the solid state all contribute to our national storehouse of technical and engineering know-how.

Successful pursuit of research in the College of Engineering depends on a competent staff and competent graduate students. The latter are expected to become our industries' guiding hands and heads in the years to come. We, as a nation, cannot afford to lose one potential graduate student of outstanding ability. The apparent financial sacrifice of the additional years of study will be more than re-gained by those students with Ph.D. potential. It is fervently hoped, therefore, that those Wisconsin graduates of engineering, who have the capacity for graduate research will heed this "call" and investigate the possibilities of graduate study, either at Wisconsin or some other recognized engineering school. Graduate study at another university is a wise plan. It broadens a man's viewpoint, brings new friends, and carries fresh ideas to the other school.

END

Beer Making - -

(*continued from page* 19)

Biochemical Reactions in the Mixer Tank

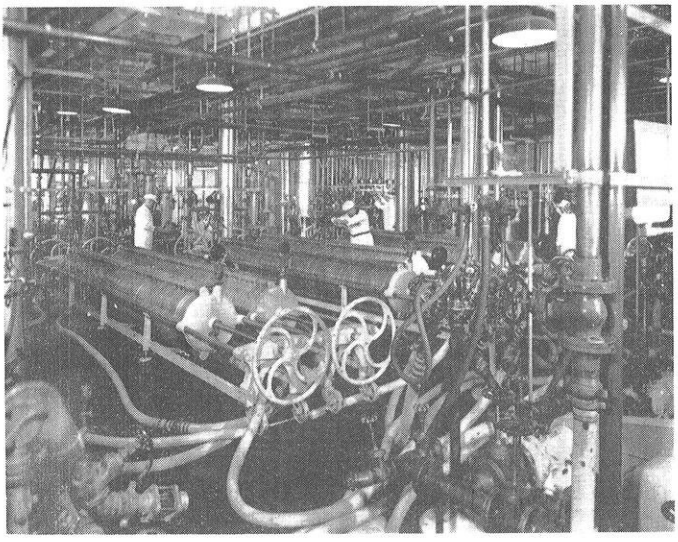
The two important enzymes in the conversion of starch to sugar in the mixer tank are alpha and beta amylase. They are present in sufficient quantity in the malt to convert the starch of both malt and adjunct to sugars. The alpha amylase splits the starch molecule to dextrin only, whereas the beta enzyme converts the starch and some of the dextrin into the sugar, maltose. Too high a temperature will favor the activity of the alpha amylase and therefore a high dextrin percentage. After the starch has all been converted, the mix is filtered and the fluid called wort (pronounced wert) is pumped into the brew kettles that can hold about 14,000 gallons each

The functions of the Brewing kettles are many. The enzymes are killed and the wort sterilized to prevent any unwanted action during later stages of production. Boiling for two hours concentrates the wort and dissolves essential oils and resins from the hops that are added to the wort in the brew kettle in amounts of 0.4 to 0.7 pounds per barrel of wort. The boiling also precipitates the proteins, coagulable due to the heat and the chemical reaction with the tannin of the hops.

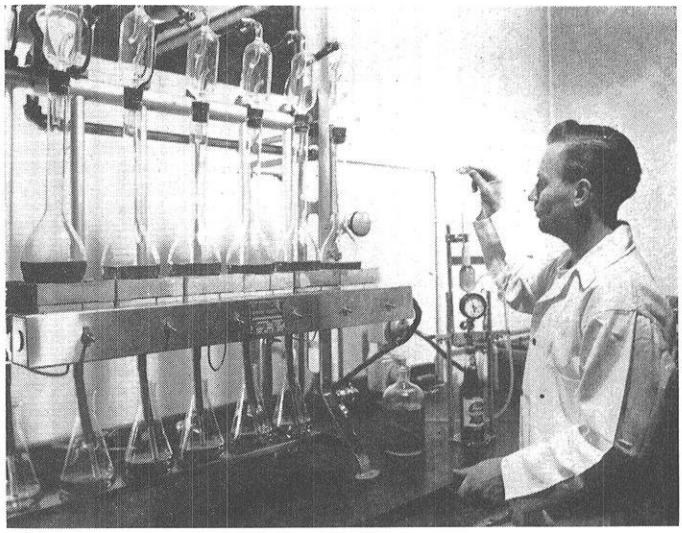
Spent hops are separated from the wort in the hop jack, a large tank that will hold the entire brew. The hot wort is then cooled in two stages to remove, as a precipitate, as much as possible of the haze-producing constituents. Aeration helps in the removal. Air circulating in the room containing the coolers is sterilized to prevent any infection of the wort by bacteria.

Fermentation and Storage

The cooled wort, rich in sugars and B vitamins, is now ready to have yeast added and to begin fermenting. Each brewery grows its own particiular strain of yeast and sacrifices nothing in keeping the culture uncontaminated. A certain Milwaukee brewery has been using their own special strain of **Saccharomyces cerevisiae** since 1899. A wild yeast in the fermenting tanks could spoil thousands of barrels of beer. The function of the yeast is to convert the sugars of the wort to carbon dioxide and ethyl alcohol (the process called fermentation). The velocity of fermentation depends on a variety of factors: concentrations of yeast and sugar, fermenting power of the yeast or zymase activity, temperature, and pH. The temperature varies from 40-50°F. for bottom fermenting (lager) to 50-65°F. for top fermenting (ale) yeast. About one pound of thick liquid yeast is pitched per barrel of wort. The average time of fermentation is 7 days but may be from 5 to 11 in extreme cases. A daily check by the control laboratory is made of every tank for alcohol content and specific gravity. When the alcohol content rises to 5-6% the fresh beer, called "green" beer, is transferred to storage tanks. The temperature is kept at 32°F. to allow for a maturing of the beer without an increase in fermentation. The change that occurs during storing is clarification due to the settling of yeast, proteins, and hop resins. Low temperature and slowly decreasing pH promote the settling. The flavor and aroma of the beer improve due to the development of various esters and very small amounts of phosphoric, lactic and acetic acids. After most of the yeast has settled the beer is filtered and pumped to clean tanks for a second storage. After fermentation the beer is kept under a pressurized atmosphere of carbon dioxide. Storage takes from 1 to 6 months, most beers being stored for 2 to 3 months.



Final filtration of the beer through the round plates of pressed filter mass.



Chemist determining the CO_2 content of beer. Protein content is measured in the stand at left.

In the filter cellars water is added to adjust the alcohol content to uniform requirements and the beer is then filtered and carbonated. The amount of carbon dioxide varies from 0.4 to 0.6% by weight. The beer is now "finished" and is ready for canning, bottling and filling of kegs. Packaging operations are today highly mechanized—washing, filling, pasteurizing, and labeling being done in continuous operations. Bottle machines work up to 240 per minute whereas some can lines operate at 1200 per minute.

Only a few breweries sell any unpasteurized bottle beer, but all keg beer is unpasteurized and requires constant refrigeration to maintain its high quality. END

WSPE

(*continued from page 43*)

New Members	Sponsors
Fox River Valley	
Carl W. Giesler	L. H. Kingston
Evan W. James	L. H. Kingston
Francis L. Macnamara	*Wayne G. Bryan
Roland H. Detjen	*John K. Primm
John H. Trester	*John K. Primm
Robert H. Miller	*Wayne G. Bryan
Jules Gilpatrick	*Wayne G. Bryan
Western	
Ralph L. Major	*M. A. Eklund
Robert M. Schelble, Sr.	J. W. Johnson
William D. McCoy	*Zenno Gorder
John S. Burg	J. W. Johnson
Robert E. Olson	*John Mangan
Wisconsin Valley	
Henry Winat	A. L. Genisot
Gordon E. Boettcher (E-I-T)	A. L. Genisot
John L. Sullivan, Jr.	*Carl A. Cajanus
John Crook	*Carl A. Cajanus
Out of State	
Ambrose O. Poulin (E-I-T)	F. L. Carlson
Kenneth W. Geiser (E-I-T)	F. L. Carlson

(*please turn to page 62*)

Richard J. Conway, Lehigh '51, selects Manufacturing Engineering at Worthington

RICHARD CONWAY checks cutting tool with machinist before milling a pump casing.

After completing his general training which brought him in contact with all departments, Richard J. Conway decided that manufacturing engineering was his field. He says, "I chose the Manufacturing Engineering Department after completing my general training at Worthington because as a graduate in Industrial Engineering I can learn the practical aspects of my field while applying theory I learned in college.

"The personnel of this department work together as a team toward the solution of the numerous problems which arise daily. We have the cooperation of all other departments in the corporation in getting the necessary facts pertinent to the solution of these problems. In the course of our day it may be necessary for us to meet the Plant Manager, Chief Engineer, Comptroller, several department heads, clerks, foremen, machinists and many others throughout the company.

"I have contributed to the solution of many problems handled by this department including metal spraying, machining procedures, purchasing new equipment and designating proper dimensions to obtain desired fits between mating parts.

"I enjoy my work because I'm doing the work I want and my formal education is being supplemented with practical knowledge gained from the tremendous wealth of knowledge available to me at Worthington. I know from personal contact with many other departments in the Corporation that Worthington can and will find their young engineers a spot which will give them the same opportunities as have been afforded me."

When you're thinking of a good job, think *high*—think *Worthington.*

FOR ADDITIONAL INFORMATION, see your College Placement Bureau or write to the Personnel and Training Department, Worthington Corporation, Harrison, N. J.

WORTHINGTON

The Sign of Value Around the World

PROGRESS OF A PROBLEM

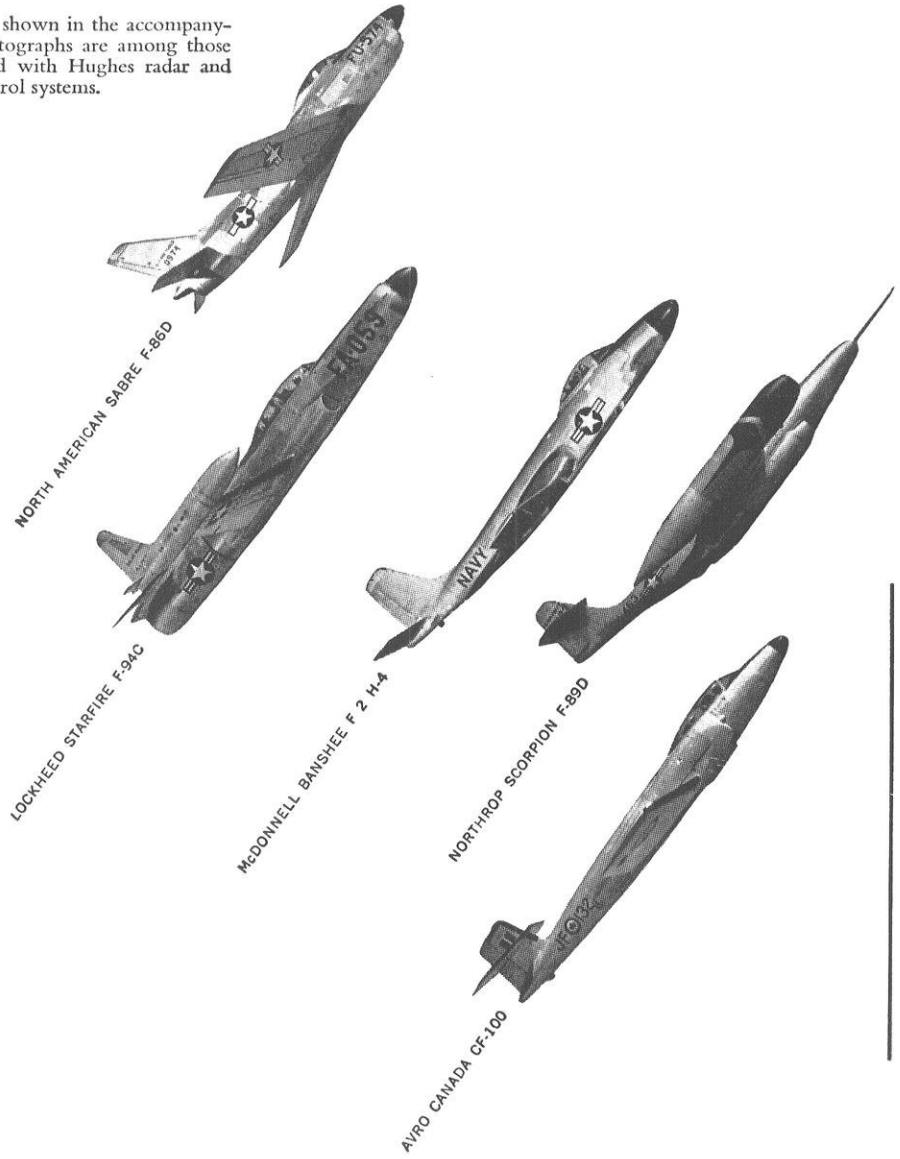
THE PROBLEM:

To design and manufacture advanced radar and fire control systems for military all-weather fighters and interceptors—equipment that must be light in weight, versatile, and capable of accurate operation day or night under extreme conditions.

At Hughes the answers to these requirements for complexly interacting systems involving advanced radar and fire control have been under continuing development from *1948* and in production since *1949*. Even more advanced systems are currently in process of development for supersonic aircraft.

Beginning with systems engineering and analysis, the military studies are initially concerned with evaluation of the strategic and tactical needs of the services in order to establish design objectives. This is followed by the analysis of problems involving noise, smoothing and prediction, multi-loop nonlinear servos, aircraft dynamics and controls, and the properties peculiar to conversion of analog information to digital quantities. From the analytic stage evolve the requirements for systems design and circuitry, designs of computing sub-systems, microwave transmitting and receiving equipment, the presentation of information to an airplane pilot, and advanced testing needed to optimize over-all system performance.

Aircraft shown in the accompanying photographs are among those equipped with Hughes radar and fire control systems.



SYSTEMS ENGINEERS

CIRCUIT ENGINEERS

Further advancements in the fields of radar and fire control are creating new positions on our Staff for engineers experienced in the fields of systems engineering and circuit design, or for those interested in entering these areas.

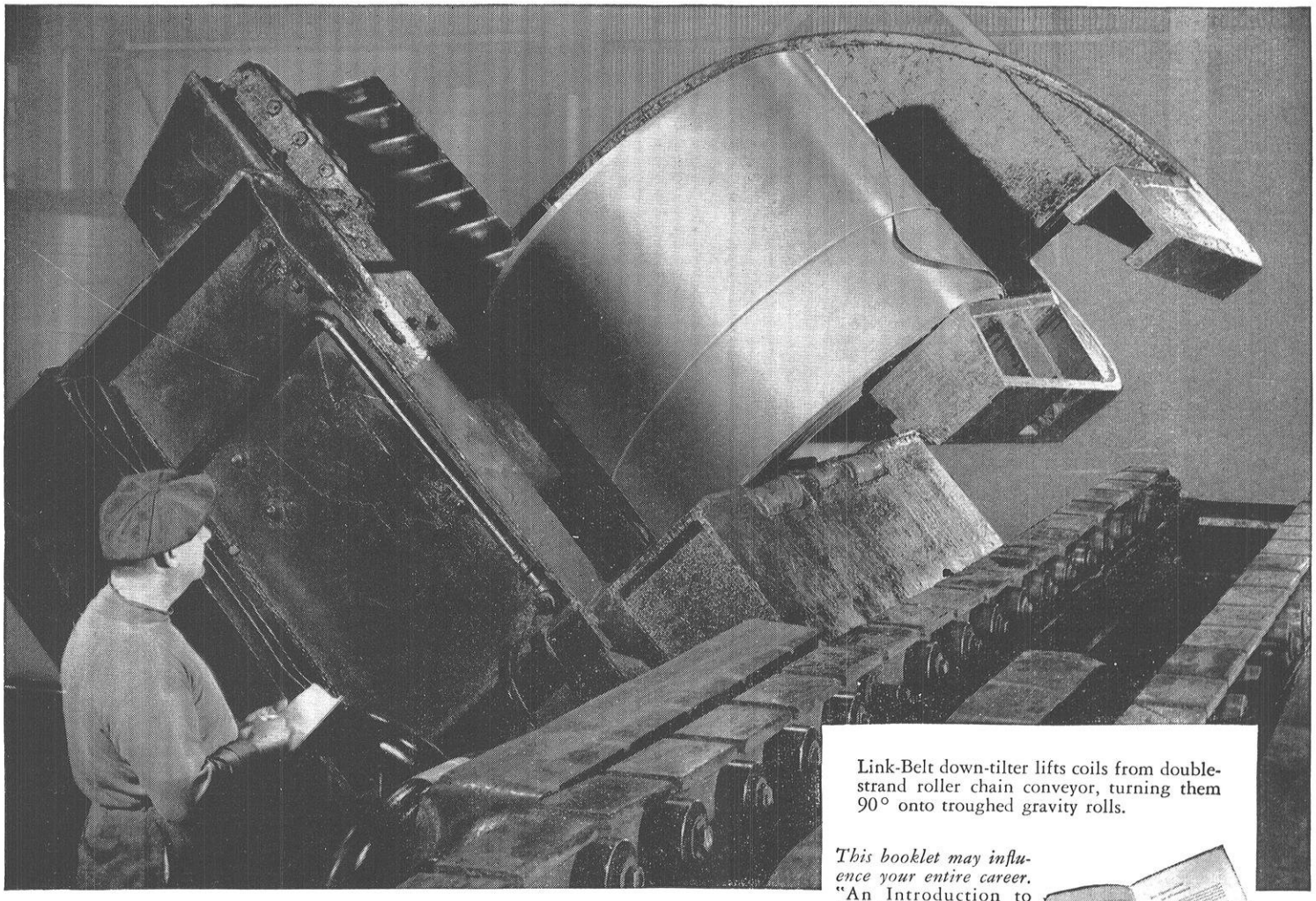
SCIENTIFIC
AND
ENGINEERING
STAFF

HUGHES

RESEARCH AND DEVELOPMENT
LABORATORIES

Culver City, Los Angeles County
California

It "babies" giant steel coils to boost yield... cut waste



Link-Belt down-tilter lifts coils from double-strand roller chain conveyor, turning them 90° onto troughed gravity rolls.

Another example of opportunities for engineers at LINK-BELT

The facility to handle large coils of steel strip efficiently is responsible for much of America's ever-increasing rate of steel production. Specialized conveying systems—designed, built and installed by Link-Belt—play an important part in this continuing progress.

Coils weighing up to 76,000 pounds can now be moved around corners, up and down inclines. Auxiliary devices transfer the coils from one conveyor to another . . . turn, weigh, lower or tilt them—with improved safety and a minimum amount of manual control—to match the high capacity of modern new mills.

Yet so gently is this done that there's no scuffing of edges, no telescoping of coils. Yield is increased because of lower scrap losses.

Steel is just one of the many important industries served by the engineers of Link-Belt. If you're interested in opportunities with a company whose stability and growth are rooted in every important phase of our nation's economy, write for 12-page illustrated booklet at right. You are also invited to visit one of the Link-Belt plants listed here.

This booklet may influence your entire career. "An Introduction to Link-Belt" answers questions an engineering graduate must ask about the company he goes to work for. It sets forth Link-Belt's scope and operating policies . . . describes opportunities in varied phases of engineering.

LINK-BELT

LINK-BELT COMPANY

Executive Offices: 12,780-B

307 N. Michigan Ave., Chicago 1, Ill.

Atlanta . . . . . 1116 Murphy Ave., S. W.
Cedar Rapids, Iowa . . . . . 1201 Sixth St., S. W.
Chicago 9 . . . . . 300 W. Pershing Road
Chicago 8 . . . . . 2410 West 18th St.
Colmar, Pennsylvania . . . . . 3400 Walnut
Houston 1 . . . . . 3203 So. Wayside
Indianapolis 6 . . . . . 220 S. Belmont Ave.
Indianapolis 6 . . . . . 519 N. Holmes Ave.
Los Angeles 33 . . . . . 361 S. Anderson Ave.
Minneapolis 5 . . . . . 200 Lyndale Ave., N.
Philadelphia 40 . . . . . 2045 W. Hunting Park Ave.
San Francisco 24 . . . . . 400 Paul Ave.
Seattle 4 . . . . . 3405 Sixth Ave., S.

One source . . . one responsibility
for conveying and power transmission machinery

McCormick's

Engine-Ears

by Larry McCormick, ch'55

ST. PAT'S DANCE

A sound that started to faintly pervade the air on campus, about a month ago, is now a dull roar. The sound is loudest when approaching the rooms in which reside the contestants in the St. Pat's beard growing contest. The sound, I am told, is due to the formation of ferric oxide on implements used to scrape, shave, or pull hairy growth from the lower part of the face. Or as an ME would say, "Duh, dem razors is sure rustin'." The beard growing boys have caused some concern to ROTC units. On Friday, Feb. 12, AFROTC was taking mug shots of advanced corps men to be used in future mourt martial proceedings. Bob "Rupe" Rayford appeared, dressed in his pretty blue suit. His buttons were polished and his little black shoes were shined. But the staff member charged with the task of snapping his picture stoutly refused to trip the shutter. On top of Rupe's smartly squared shoulders, sat a face decorated with a straggling black beard. If that picture had gone into headquarters Joe McCarthy's paid subversive hunters would be on campus the next day.

AIEE-IRE

On the 10th day of March at an AIEE-IRE meeting, a talk on those amazing little wonders, transistors, was given by Mr. Herbert Zwarra, a representative of Bell Telephone Laboratories. Attention! All members of AIEE! A colossal contest is being held in late April. Students are to submit papers and the best will give its writer a trip to the AIEE district meeting in Fargo, N.D. on the 10th, 11th, and 12th of May. If the paper wins in Fargo, the writer gets a trip to the finals in Los Angeles.

Just in case anyone is curious about the identities of AIEE-IRE's officers, here they are: Tom Benedict, chairman; Guenther Machol, vice-president; Don Schulz, secretary-treasurer; Don Levy, corresponding secretary for AIEE; Don Selwin, corresponding secretary for IRE. Two Polygon representatives are: Jim McNaul and Bob Stebens.

MINING AND METALLURGY CLUB

On Feb. 25, the Mining and Metallurgy Club held a dinner. A good Southern meal of ham and candied yams was set before the men with steel hats. An after-dinner speaker, Mr. Will Mitchell Jr. of Allis-Chalmers Corp. talked on "Pelletiding of Iron Ore Fines" On March 25, the club plans a business meeting to determine next year's program and to nominate new officers.

BADGER AUTO CLUB

Brooks Stevens, a noted industrial designer and sports car builder, gave a talk and demonstration Tuesday, Feb. 23, to the Badger Auto Club, explaining the intricacies of sports car design. As a model, he used drawings of his own "Excalibur," a fine sports car. A discussion period followed the talk.

THETA TAU

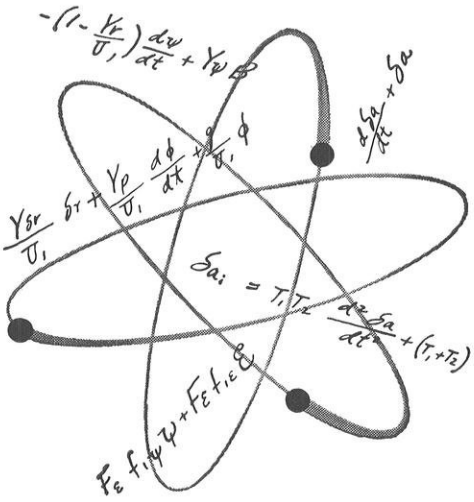
Theta Tau, an all-engineering professional fraternity held an introductory meeting Feb. 10, at the Hydraulics Lab. The fraternity is eagerly looking for new members. Drop over to a meeting sometime fellas!

In obedience to an editorial order, I have tried to stick to facts this month. Just wait for the next issue, where fiction may win over fact in spite of an editorial desire to keep the magazine informative.

AIChE

Local Chapter 1 1 9 6 8 4 0 2 7 5 4 AIChE listened Feb. 17 to Dr. Lee of the Wisconsin State Dept. of Industrial Hygiene, talk on "Industrial Wastes." (Note: For three years, the writer has labored in ignorance. Mr. Jerry Bard, AIChE secretary has finally sold him on the advantages that the group offers I'll have that $1 semester's dues in class Friday, Jerry.)

Future of Automatic Controls brings new opportunities for engineers and scientists at Honeywell



As science advances, and as our country continues to develop its industrial might, the business of automatic control gets bigger and increasingly important.

For the prime force behind the 20th century revolution has been and will continue to be *automatic control.*

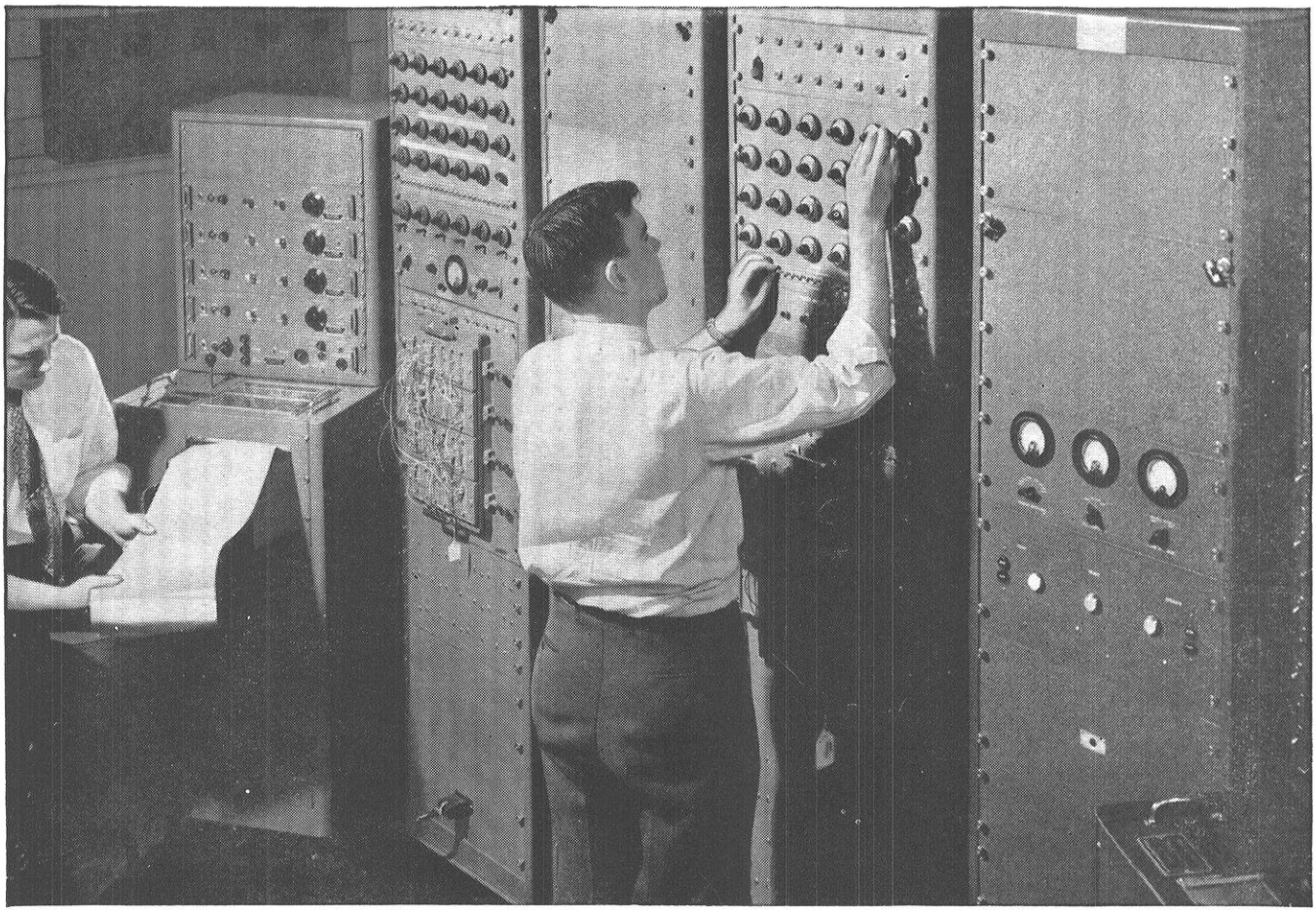
So at Honeywell, leader in this field for over 60 years, it of course means a bigger, more exciting, more challenging job ahead—all of which adds up to greater opportunities for engineers and scientists.

And that's why we're always looking for men with ideas and ambition to grow with us.

Here at Honeywell one out of ten employees is engaged in research and engineering activities.

Shown below is part of our Aeronautical Division's analog computing equipment, which helps our research engineers to develop and simulate flight tests on automatic controls for aircraft. It's typical of work being done by all of the company's eight divisions in plants across the country.

So if you're an engineer or scientist and like to use your imagination freely in such fields as electronics, hydraulics, mechanics, chemistry, physics, and a wide variety of others, be sure to send in the coupon below.



America lives better—works better—with Honeywell controls.

MINNEAPOLIS **Honeywell**

HONEYWELL

First in Controls

MINNEAPOLIS-HONEYWELL REGULATOR CO.
Personnel Dept., Minneapolis 8, Minnesota

Gentlemen: Please send me your booklet, "Emphasis on Research" which tells more about engineering opportunities at Honeywell.

*Name*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

Cinemascope - -

(*continued from page* 21)

onable depth field, a stopped-down camera lens must be used. This in turn calls for intense lighting of the scene, making the use of flawless scenery a necessity if undesirable flaws are not to be recorded on the film.

The image is projected on a special screen, a Magic Mirror Screen, so called because its surface is mirrorized with millions of tiny lenses to reflect more light. The screen is also slightly curved so that a sharp focus is maintained tnroughout the width of the picture.

The extreme width of the screen (30 to 60 feet) makes feasible the use of a stereophonic or directional sound system as an integral part of Cinemascope. The sound is magnetically recorded on three separate sound tracks, each of which feeds its own loudspeaker during presentation. The loudspeakers are located at different points along the screen's width. A sound originating from a point near one loudspeaker is boosted on that loudspeaker and shaded on the other two, giving direction to the sound, and a startling, realistic effect to the audience.

This then is Cinemascope—the anamorphic lens, the Magic Mirror Screen, the stereophonic sound system. It increases the field of the camera, but necessitates no increase in film size (the larger the film, the greater its tendency to buckle in the camera becomes), no wholesale replacement of standard equipment, and no special glasses for viewers.

END

Engineering Profession - -

(*continued from page* 32)

industrial executives are engineers. In such positions the ability to deal with human and business problems is of paramount importance. Supplementing engineering courses with training in commerce, labor relations, and law, either while in college or later, can pay handsome dividends.

Whether the division is by fields or by function there are no hard and fast lines of demarkation. It should be emphasized that many areas of work and a large variety of duties are common to several divisions. For this reason you will find many common courses in the several curricula. All students are required to take identical fundamental courses in English and mathematics and substantial, though not identical, courses in chemistry, physics and mechanics. Electrical engineers, while taking intensive courses in electrical power and communications, will also take condensed courses in thermodynamics and hydraulics. Similar arrangements are made for those enrolled in the other fields.

As in any profession, success in engineering demands integrity, industry, perserverance, courtesy, and good personality. In addition, interest in and aptitude for mathematics, the sciences, and written and oral expression are of primary importance. If you possess these qualities and aptitudes and find the duties of engineers attractive you can become a successful engineer. The demand for men and women with sound engineering training is great. The rewards, materially and in personal satisfaction, are substantial.

END

ROTC - -

(*continued from page* 25)

tary graduate. A distinguished military graduate is recognized by his professors and friends as an outstanding man. He has also qualified himself for a commission and career in the regular service.

If you are still in high school and intend to continue your education, write to your professor of military science and tactics at the college or university of your choice and ask them for information regarding their ROTC program.* They will be happy to help you. Start planning now to get the most out of your ROTC training.

To the young people of today remains the task of maintaining our bulwarks of defense without impairing our economy. You can help in this comprehensive problem by taking advantage of your ROTC program. Undoubtedly never again will a Dunkirk or a Stalingrad give us time to prepare. Will you be ready?

*Just address your inquiries to: Professor of Military Science and Tactics, University of Wisconsin, Madison, Wisconsin.

END

—ALUMNI NOTES—

by Richard White, c'55

Worden, Robert A., ch '49, recently spent some time at the Forest Products Laboratory in Madison working on the development of pulps for various industrial papers. One of the new pulps being studied is derived from a South American product called carva grass, and will will be used in the manufacture of abrasive paper tapes. Mr. Worden is employed with the Minnesota Mining and Manufacturing Company, where he is engaged in the research and development of new products in the products fabrication laboratory of the company.

Duszynski, Edwin J., c'37, has resigned as city engineer of Cudahy, Wisconsin, to accept the newly created position of director of public works for Appleton, Wisconsin.

Wollering, Walter R., met'44, is now a metallurgical engineer with the Ladish Company of Cudahy, Wisconsin.

Klossner, W. J., Jr., ch'47, is now home on a two month vacation from his work with the Lago Oil and Transport Company, Limited, of Aruba, Netherlands, West Indies. This company, a subsidiary of Standard Oil of New Jersey, is the largest refinery in operation in the world at the present time. Mr. Klossner is a group head in process control work. A two month vacation is granted to him every two years; this time he flew back to Miami, Florida, and had his car shipped to the U.S. on a New York tanker.

Miezio, Maximillian M., met'52, is employed with the Sivyer Steel Casting Company in Milwaukee, Wisconsin.

Willoughby, Robert A., min'35, is now owner of the Wickenburg Ore Market in Wickenburg, Arizona.

Busby, Lynn J., c'25, secretary-treasurer of the Wisconsin Culvert Company of Madison, was recently elected president of the Toncan Culvert Manufacturers Association at a meeting in Cleveland, Ohio. The association is composed of manufacturers of corrugated metal pipe.

Landkamer, James C., ch'51, is now working for the Minnesota Mining and Manufacturing Company. He is doing chemistry work in the analytical laboratory of the tape division.

Lauck, Francis W., ch'40, m(MS) '52, is engaged in product and factory engineering for the welding electrode division of the A. O. Smith Corporation in Milwaukee, Wisconsin.

Archer, Lee A., m'46, has left the Fairbanks-Morse Company of Beloit, Wisconsin, and is now chief design engineer for the Pyle National Company, Chicago, Illinois.

Pophal, Neal F., c'52, engineer with the City of LaCrosse, Wisconsin, recently passed away at his home following an attack of virus pneumonia.

Marschall, Charles W., met'53, is working in the research laboratories of General Motors Corporation in Detroit, Michigan.

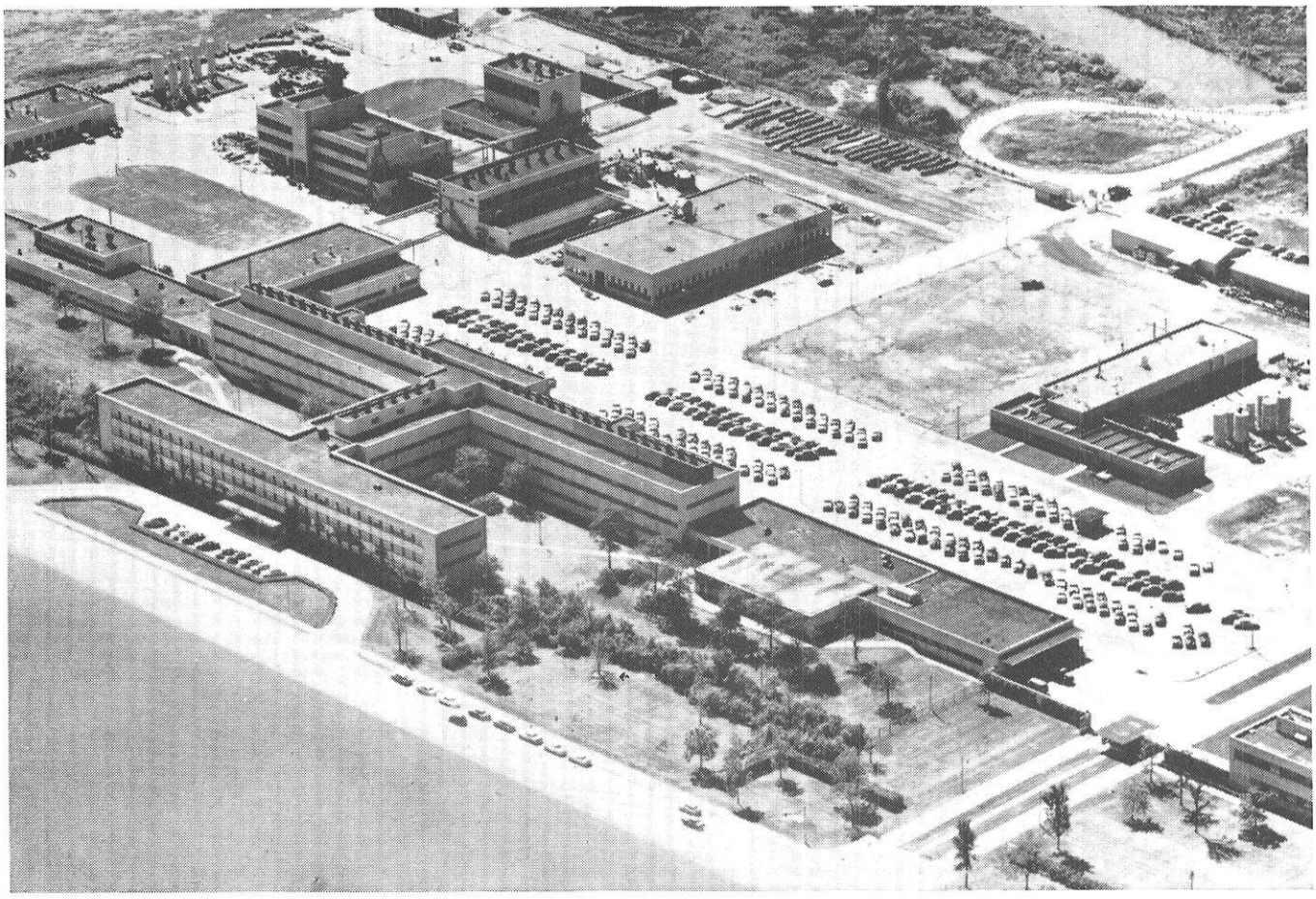
Nikora, Leo S., m'36, has left the Shell Oil Company and is now in business for himself manufacturing plastic products in his factory in Connecticut. He continues to reside in White Plains, New York.

Ralph, Eugene L., ch'53, is with the Phillip Chemical Company in Pasadena, Texas. The Phillip Company recently completed the construction of an ammonium sulphate plant and a methyl vinyl pyridine plant, and both are now in operation. At the present time, the company is constructing plants for producing superphosphate and anhydrous ammonia. Ralph has been engaged in the construction of the ammonia plant.

Feirn, William H., m'24, president of C. A. Hooper and Company, died in February of a heart attack. Interment was here in Madison, Wisconsin.

Several recent Wisconsin graduates and their new jobs are:

William C. Dries, m'53, a civil-mechanical engineer assistant with the U.S. Army, Fort Monmouth, New Jersey; **Ervin A. Koth, Jr.,** m-'53, an engineer in the testing laboratory of the Heil Company, Milwaukee, Wis.; **Raul A. Stern, m'53,** an engineer trainee at the Cummins Engine Company, Columbus, Indiana; and **Earl G. Sieverkropp, m'53,** in the U.S. Army as a mechanical engineer.



MOST OF THE RESEARCH WORK that led to the development of Ultraforming—a more efficient and economical refining process—took place in the Whiting research laboratories of Standard Oil, above. Extensive studies in seventeen research-scale units demonstrated the merits of cyclic regeneration.

Standard Oil scientists develop **Ultraforming--** the latest in catalytic reforming

After several years of research, Standard Oil scientists have developed a new and important refining process—Ultraforming.

The process is a better way of improving the low-octane straight-run gasoline found in crude oil. To make such gasoline suitable for present day cars, refiners must change it into an entirely different material, which gives good anti-knock performance. The change is known as reforming.

Ultraforming is the last word in catalytic reforming. It gives greater yields of higher octane gasoline than were previously possible and gets good results even with poor feed stocks. In addition, it raises the yield of hydrogen, an increasingly valuable by-product of catalytic reforming.

Ultraforming units do not have to be shut down when the catalyst begins to lose activity through use. By a new technique, an improved platinum catalyst is regenerated to maintain peak performance.

The advantages of Ultraforming over previous methods are so great that Standard Oil and its subsidiary companies are building units at four refineries. They will start operating this year. The new process, of course, is available to the petroleum industry through licensing arrangements.

At Standard Oil, young engineers and chemists work with the stimulating knowledge that they are participating in important and lasting contributions to the oil industry and to their country.

Standard Oil Company

910 South Michigan Avenue, Chicago 80, Illinois

STANDARD

So You're Smart

A Few Brain-Crackers For Your Spare Time . . . Try Some!

ANSWERS NEXT MONTH

GEOMETRY

These two geometry problems should bring back memories to upper classmen of quizzes in descriptive geometry. What are the third views?

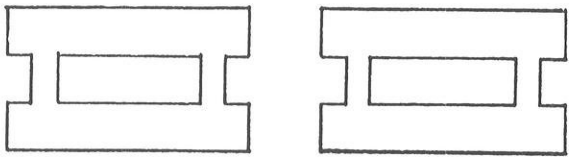


Fig. 1

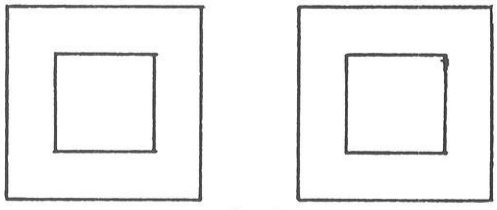


Fig. 2

MORRA

There is an old Italian game of Morra which if properly played should be good for a few beers. Each of two players simultaneously extends one, two, or three fingers and alternately tries to guess the sum. What is a consistent system for winning?

* * *

LOGIC

A man living on the twelfth floor of an apartment building, took the self-service elevator to the ground floor every morning on his way to work; on returning home at night, however, he took the elevator to the eighth floor and walked up the stairs for the remaining four floors. Give a logical explanation for this.

* * *

DILL PICKLES

Up in Michigan they came up with this little gem. If it takes 10 hours for a duck with a rubber bill to chop $65 worth of shingles from an oak tree, how long does it take a woodpecker with a wooden leg to kick the juice out of a dill pickle?

Last Month's Answers

CRYPTOGRAM

126
125

630
252
126

15750

•

TAXES

A little simple algebra will show that the area is $\frac{1}{2} \times 100 \times 60 = 3000$ square yards.

•

CANNIBALS

A diagramatic solution of this problem will probably be less confusing than a jumble of words. We'll let C represent a cannibal, and let M represent a missionary. The arrows indicate the direction of crossing.

—— 2C ——>
<—— C ——
—— 2C ——>
<—— C ——
—— 2M ——>
<—— MC ——
—— 2M ——>
<—— C ——
—— 2C ——>
<—— C ——
—— 2C ——>

BOATING

If you missed this, you'd better drop out of engineering. Let d= distance traveled upstream, and let t=time necessary for the trip upstream. Then,

$d = (5-3)\,t = (5+3)\,(5-t)$

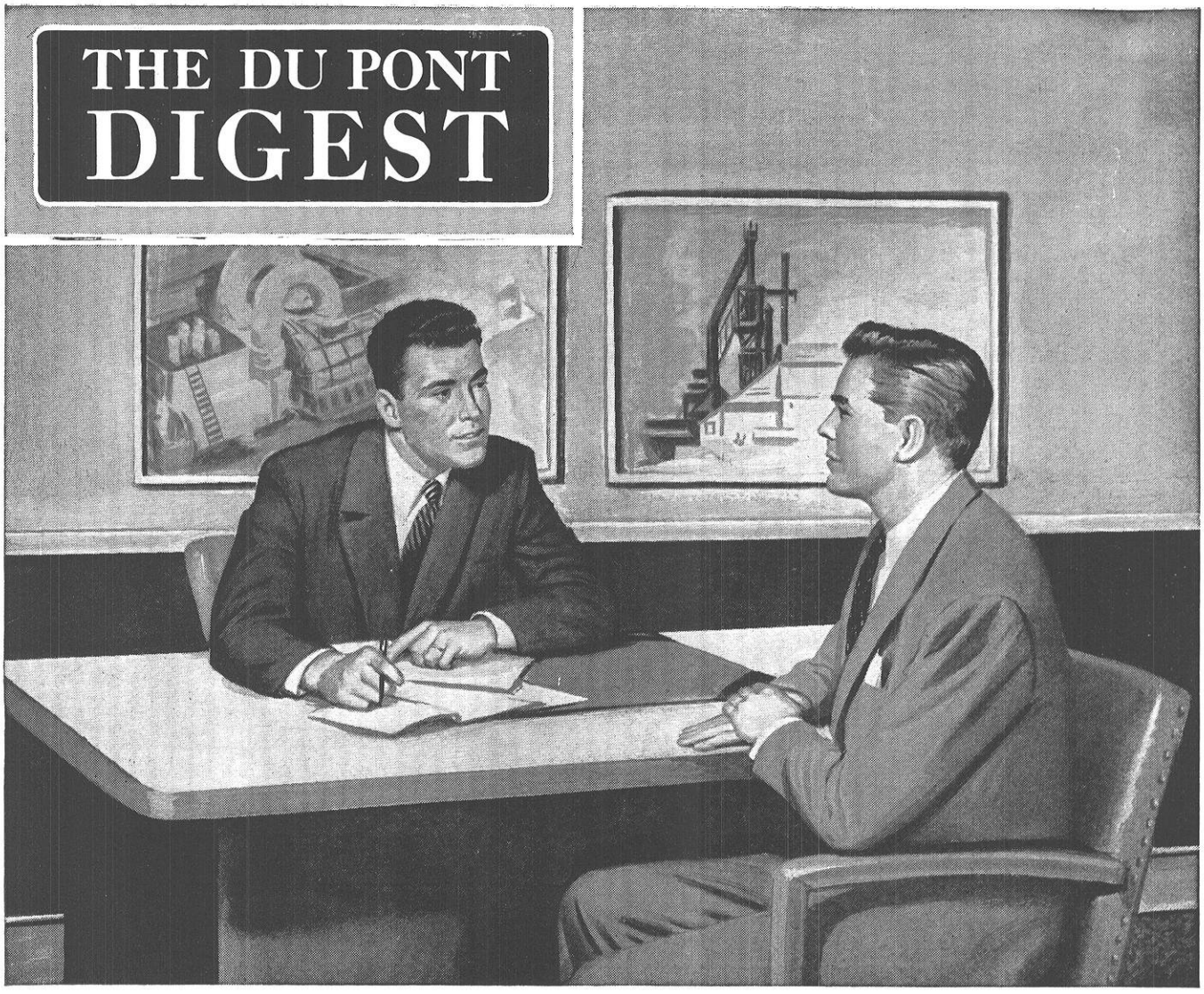
From this it is seen that t=4, d=8, and the total distance traveled is 16 miles.

•

RACING

The key lies in the construction of a three-four-five triangle from which we deduce that we go four miles per hour and take fifteen minuites.

THE DU PONT DIGEST



What do YOU look for in an employer?

Undoubtedly, you'll want most of the following characteristics:

1. Job satisfaction—the chance to do work you really enjoy.
2. Recognition—the assurance that good work will be noticed, appreciated, and properly rewarded.
3. Opportunities for advancement—a growing company can provide them.
4. Security—the knowledge that a company is both stable and progressive.
5. Pride—a feeling that your company is respected by the public and produces goods which contribute to a better way of life.
6. Good companionship—a factor which contributes greatly to happiness on the job.
7. Good pay—not in salary alone, but also in terms of vacation plans, pensions, and other benefits.
8. Safe working conditions.

How can you obtain this kind of information in advance?

One of the best ways is to discuss the matter with an acquaintance already working for the company you are considering. You will also find it helpful to consult your college placement officer, your professors and company representatives visiting your campus.

The selection of an employer is one of the most important decisions you'll make. It justifies considerable thought and effort.

SOON AVAILABLE for student ASME chapters and other college groups, a 16-mm. sound color movie—"Mechanical Engineering at Du Pont." For further information, send post card to E. I. du Pont de Nemours & Co. (Inc.), 2521 Nemours Building, Wilmington, Delaware.

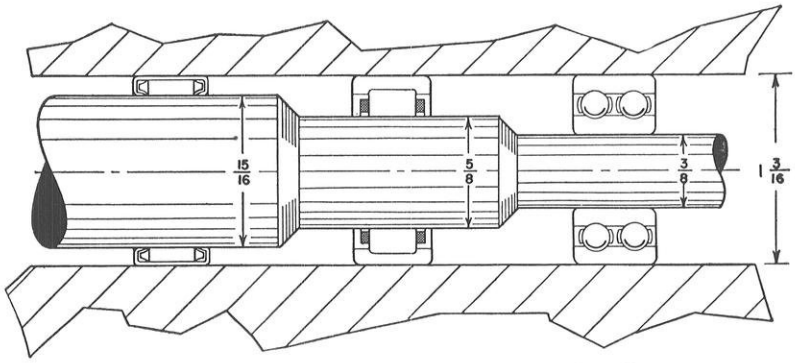
DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Watch "Cavalcade of America" on Television

The Torrington Needle Bearing
is designed for high radial loads

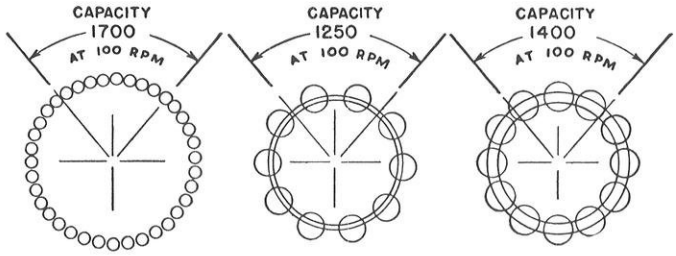
The many lineal inches of contact provided by the larger number of small diameter rollers give the Torrington Needle Bearing an unusually high load rating. In fact, a Needle Bearing has greater radial capacity in relation to its outside diameter than any other type of anti-friction bearing.



1. *Illustrates the fact that for a given housing bore size, a larger and, therefore, stiffer shaft can be used with Needle Bearings than with a roller or ball bearing.*

Precision Manufacture and Unique Design

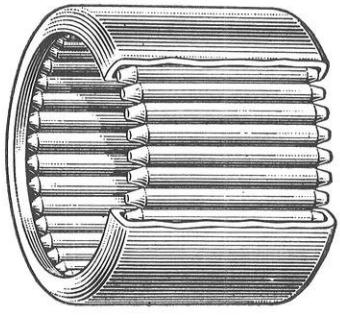
The exceptional load capacity of the Needle Bearing is the result of proper selection of steels, precision workmanship to close tolerances, and the application of modern anti-friction principles.



2. *Shows the greater number of lines of contact in the load zone of a Needle Bearing compared with a ball or roller bearing.*

The one-piece shell, which serves as the outer raceway and retains the rollers, is accurately drawn from carefully selected strip steel. After forming, it is carburized and hardened. There is no further grinding or other operation that might destroy the wear-resistant raceway surfaces. The full complement of thru-hardened, precision-ground rollers is retained by the turned-in lips of the one-piece shell.

The small cross section of the Needle Bearing allows a large shaft which permits a rigid design with minimum shaft deflection, a factor of utmost importance to good bearing design.



THE TORRINGTON COMPANY

Torrington, Conn. • South Bend 21, Ind.

District Offices and Distributors in Principal Cities of United States and Canada

TORRINGTON NEEDLE BEARINGS

NEEDLE • SPHERICAL ROLLER • TAPERED ROLLER • CYLINDRICAL ROLLER • BALL • NEEDLE ROLLERS

(*continued from page 48*)

Annual Report of National Representatives to Members of WSPE at Annual Meeting

If you have been reading your "American Engineer" for the past year, you will have noticed that the NSPE executive committee has been very busy and that the NSPE board has taken some very specific policy actions that affect NSPE, the entire engineering profession, and you as an individual engineer. I would like to recall to your mind a few of those that I believe will produce the greatest impact upon all of us in the next few years.

1. The formation of a committee to deal solely with the problems of the employee engineer in industry.
2. The salary survey and the three reports of the Professional Engineers Conference Board for Industry.
3. The proposal to Congress to retain the present professional provisions of the Taft-Hartley Act and to amend the Act by adding what is now referred to as the Kearns "Freedom of Association Bill."
4. The decision to remain outside of Engineers Joint Council but to continue to seek a satisfactory solution to the unity problem through co-operation with EJC and others.

The principal objective of the NSPE board over the past year has been to try to handle the very large and very real problem of unionization of engineers on the labor union principle. To keep the engineer on a professional rather than a trade or labor level has been a primary objective of NSPE since its inception and will continue to be so. If I interpret the board's temper correctly, NSPE will do everything in its power to prevent the profession from losing whatever professional prestige it has gained and will continue to try to develop a better and wider professional consciousness among engineers. NSPE is also trying desperately, with meager funds and voluntary help, to gain public acceptance and recognition of the engineer as a professional man rather than a trade unionist. The public relations and "Engineer Week" programs are pointed in that direction.

You now must come forward and exert some effort in your own behalf by using the material and climate produced for you. How can you do this as an individual?

First, you may communicate your gripes and your solutions to a local member of the NSPE Employee Engineer in Industry Committee, Mr. Louis Larson of Milwaukee. You can also request your chapter to take action and, by resolution, request the state society to petition the NSPE board for action. The state society's resolution must be acted upon by the NSPE board. You may also communicate directly with your national representatives, urging affirmative or negative action on any question before NSPE. All of these actions eventually lead to solution of the problem.

There are two more items that I would like to mention.

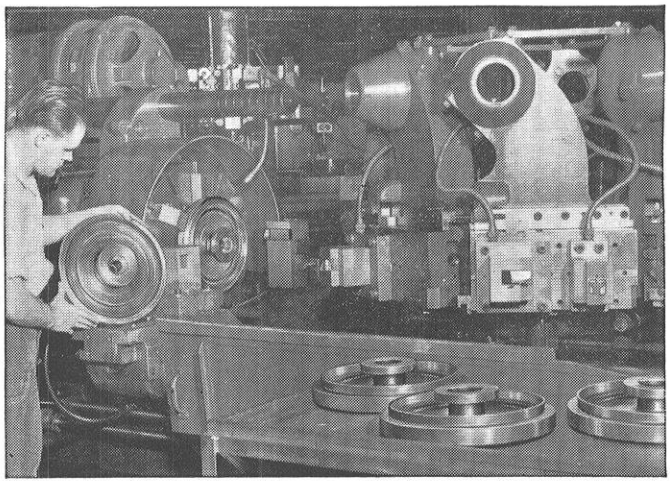
1. That NSPE will have its own new building in Washington to provide the necessary space for its expanded operations, and
2. That membership now exceeds 32,000, an increase of more than 3,400 over the past year. This compares with an increase of 1,862 for the year 1952.

●

Because of the abundance of news-worthy material resulting from the Milwaukee meeting, chapter news is being held over for the next issue. Make it your personal concern to see that your chapter is adequately publicized in this column.

END

Another page for **YOUR BEARING NOTEBOOK**

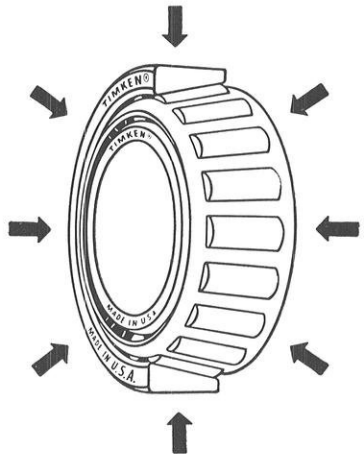


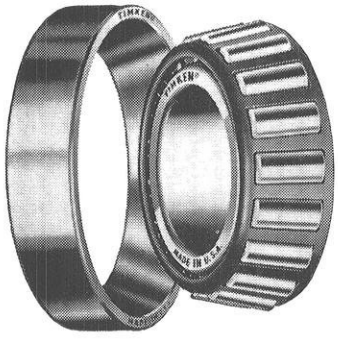
How to speed production of high precision jet engine parts

Engineers had the problem of designing a turret lathe that would machine a stainless steel jet engine part having a very complicated shape. And the part had to be produced in volume—yet with extreme precision. Naturally, they had to be sure the lathe spindle would be held rigid. To solve their problem, they mounted the spindle and gear train on Timken® tapered roller bearings, eliminating spindle vibration and chatter, insuring high precision.

Here's how TIMKEN® bearings maintain spindle rigidity

Timken bearings hold spindles in rigid alignment because line contact between rollers and races gives spindles wide, rigid support. Because the tapered design of Timken bearings lets them take radial and thrust loads in any combination, deflection is minimized, end-play and chatter eliminated. Spindles maintain their accuracy, year after year.

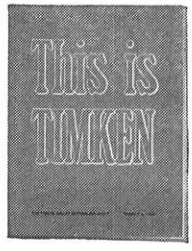




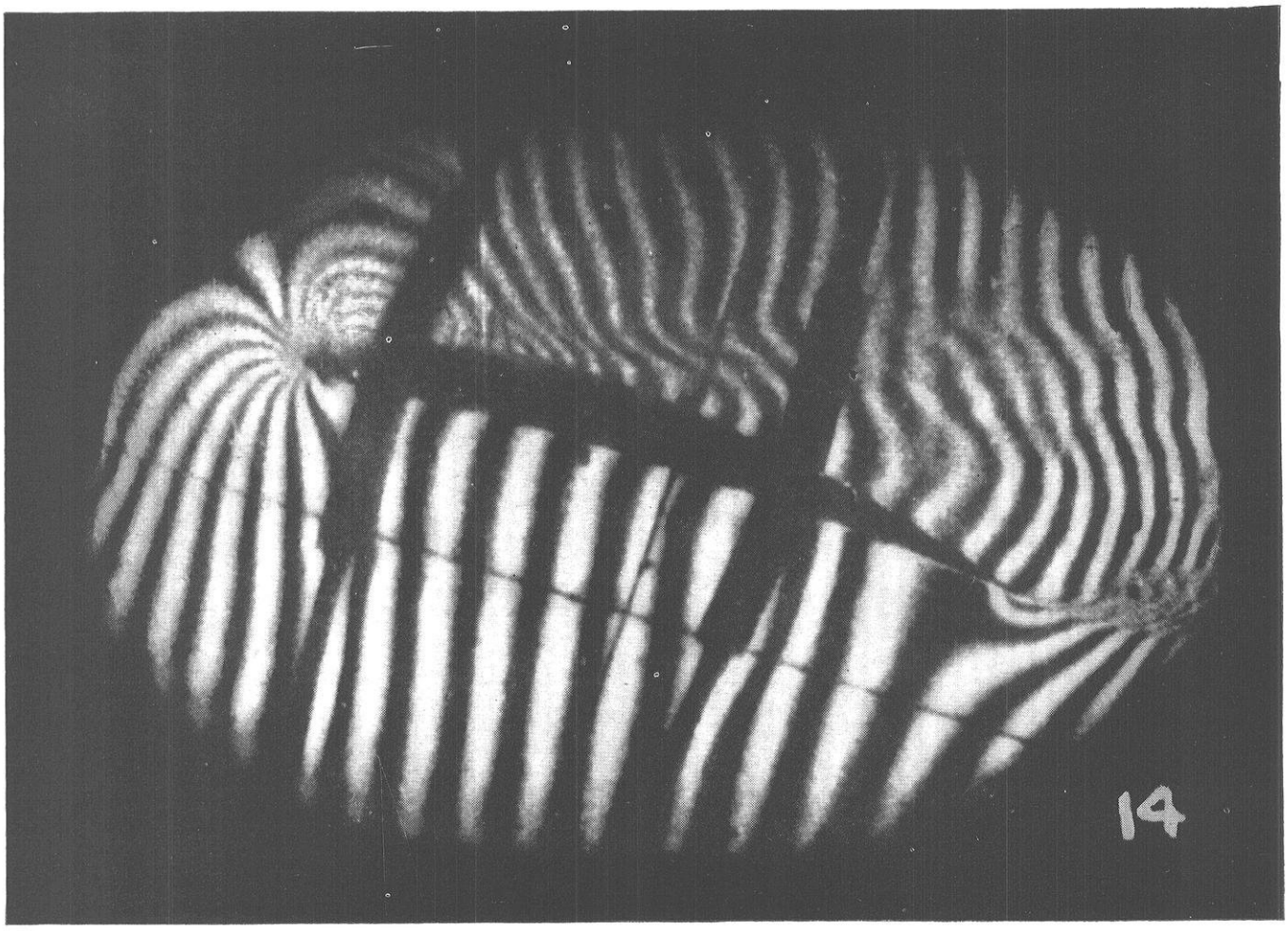
TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Want to learn more about bearings or job opportunities?

Many of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, Ohio.



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⓪ AND THRUST →⓪← LOADS OR ANY COMBINATION →⊕←



fingerprint of a flutter . . .

A jet engine compressor blade oscillating in a high-velocity air-stream made this fingerprint-like picture. Such interferograms, taken at the rate of 5000 per second, help our engineers to visualize why blades flutter. By analysis, instantaneous vibratory forces can be measured.

Accurate knowledge of blade forces and stresses permits our engineers to design the lightest blades consistent with reliability.

Studies of flow dynamics are important. Yet this is only one small phase of the research that goes into the successful development of high-performance, dependable aircraft engines for supersonic flight.

At Pratt & Whitney Aircraft the use of advanced techniques is encouraged — the most advanced facilities made available because we know that good engineering requires good tools. This partially explains why so many outstanding engineering graduates have been attracted to a career at Pratt & Whitney Aircraft.

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STATIC

BY I. R. DROPS

The house guests were assembled with their hosts in the living room after dinner, chatting pleasantly, when the five-year-old daughter of the host appeared suddenly in the room, her clothes dripping with water. She could scarcely talk, so great was her emotion, and her parents rose in amazement as she entered.

"You—you," the little girl shouted, pointing to the male of the house guests. "You are the one who left the seat up."

•

THE CRAFY DRAFTSMAN

The designer sat at his drafting board;
A wealth of knowledge in his head was stored;
Like "What can be done on a radial drill,
Or a turret-lathe or a vertical mill?"
But above all things, a knack he had
Of driving gentle machinists mad.
So he mused as he thoughtfully scratched his bean
"Just how can I make this thing hard to machine?"

If I made this body perfectly straight,
The job had ought to come out first rate.
But t'would be so easy to turn and bore
That it would never make a machinist sore.
So I'll put a compound taper there,
And a couple of angles to make 'em swear,
And brass would work for this little gear
But it's too damned easy to work, I fear,
So just to make the machinist squeal,
I'll make him mill it from tungsten steel!

I'll put those holes that hold the cap
Down underneath where they can't be tapped
Now if they can make this, it'll be just luck,
'Cause it can't be held in a dog or chuck,
And it can't be planed and can't be ground
So I feel my design is unusually sound.
And he shouted in glee "Success at last!
This damned thing can't even be cast."

•

After a brief visit at a fellow engineer's home, Pat was amazed at how often his friends grandmother read the Bible. Before leaving, he asked why the elderly woman took such a deep interest in the book. "Cramming for the finals," was the reply.

The old river boat captain was bragging to one of his passengers.

"Yup," he said proudly, "I really know this river like the palm of my hand. There ain't a sand bar on it that I ain't familiar with."

Just then the boat ran aground with a sickening lurch.

"See," he said calmly, "there's one of 'em now"

•

Girls are like newspapers: They all have forms, they always have the last word, back numbers are not in demand, they have great influence, you can't believe everything they say, they're thinner than they used to be, they get along by advertising, and every man should have his own and not try to borrow his neighbors.

•

And then there was the rather forlorn engineer who, on seeing a pigeon flying overhead, exclaimed: "Go ahead, everyone else does!"

•

SAGE ADVICE

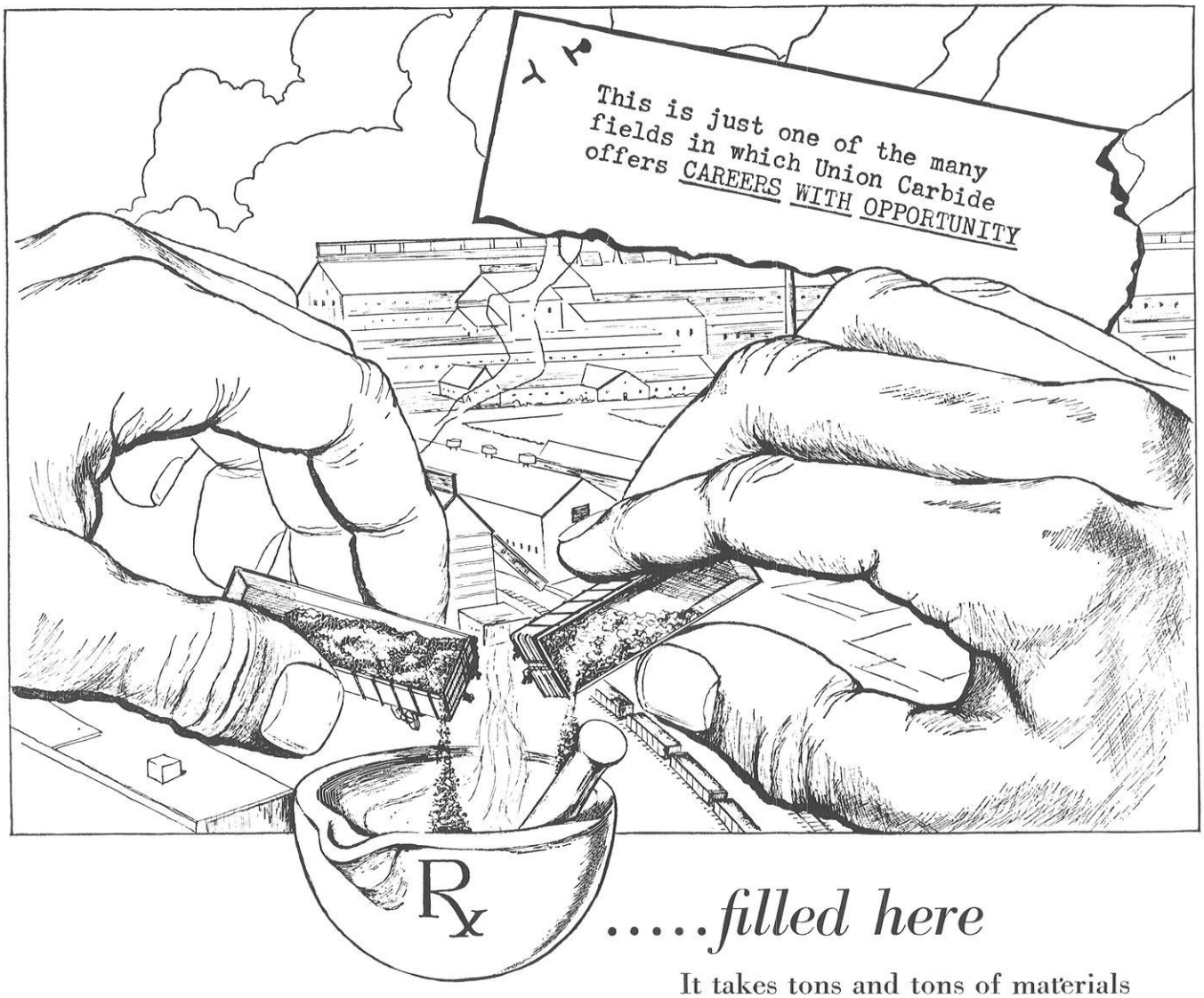
Say it with flowers, say it with sweets,
Say it with kisses, say it with eats,
Say it with jewelry, say it with drink,
But never, oh never, say it with ink.

•

An elderly couple had been married sixty years. The husband was asked if they had any quarrels during that time. His reply was no. He was then asked the secret of such a happy marriage. This was his answer. "Right after we were married we went to the mountains for our honeymoon. We went horseback riding. On the way up to the top of the mountain her horse stumbled, I looked at the horse and said 'That's once.' We went a little farther and her horse stumbled again. I looked at her horse and said 'that's twice.' We continued on our way and her horse stumbled again. I looked at her horse and said 'that's three times.' I then got off my horse and walked to her's and shot the horse. I put my wife on my horse, I got on, and we started on up the mountain. She began to chew me out for shooting the poor horse I listened carefully until she had finished and then I turned to her and said, 'That's once'."

•

Now that you've absorbed the college humor, why not try the rest of the magazine? It's not half bad . . .



.....*filled here*

It takes tons and tons of materials

to fill the prescriptions that give strength and stamina to the steel you use

THE STEEL that's everywhere—in your automobile, in trains, machines, and buildings—is stronger and more enduring because it has been treated with special "vitamins and tonics."

STEEL GETS ITS VITAMINS from the industry's "drugstores"—the plants where alloying metals are made. Here, prescriptions usually call for ingredients by the ton. Their huge "mixing bowls" are white-hot electric arc furnaces, in which temperatures reach over 3,500 degrees Fahrenheit.

These alloying metals are refined and concentrated forms of both rare and common metals. Among them are chromium, boron, silicon, tungsten, columbium, and vanadium. Individually, or together, they give steel durability, toughness, hardness, rust and corrosion resistance, and other special qualities. Chromium, for example, is the secret of making steel stainless.

VARYING COMBINATIONS of these and other alloys are added to every ton of molten steel produced today. Without them we wouldn't have the hundreds of different kinds of steel that do so much for all of us in so many ways.

MORE THAN 50 ALLOYS—The people of Union Carbide pioneered in the development and production of alloying metals. They produce more than 50 different alloys for steel and other metals that go into products that serve you.

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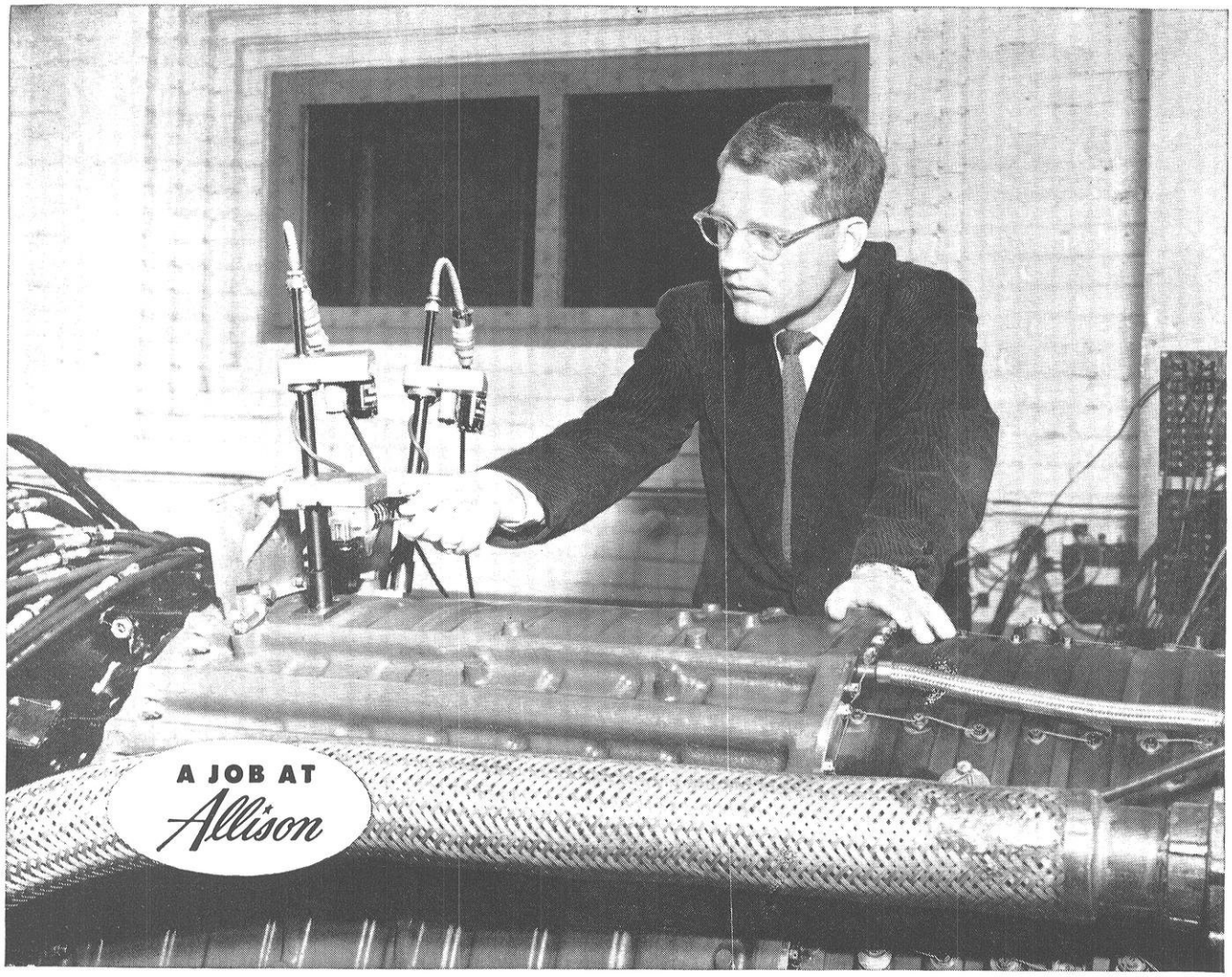

● Donald L. (Don) Dresser was a Physics Major at Beloit, class of '50. He was a member of Sigma Chi; played basketball, and shot golf in the 70's. He received his Masters from the U. of Wisconsin in 1951.

Before coming to Allison something over a year ago, Don was recalled to military service and served another 16 months in the Navy.

Now, he is a specialist in the instrumentation and electronics group at Allison. Don was assigned a problem in studying the air flow through jet engine compressors with a hot wire anemometer. It was his job all the way, working with the vendor in supplying necessary equipment which was developed to study rotating stall in axial flow compressors.

Don is shown making an adjustment on one of the probe actuators of the anemometer on a jet engine in a test cell. Cables from the anemometer lead to the control room panel where results are recorded and studied.

The very nature of Allison business continually presents a variety of challenging problems to the engineering staff, which—along with the Mechanical Engineers, Aeronautical Engineers, Electrical Engineers, Metallurgical Engineers, Chemical Engineers and Industrial Engineers—includes quite a few majors in Math and Physics like Don.

Allison needs more technically trained people, especially young graduate engineers to help handle the increasing work load in a field where future development is unlimited. Why not plan NOW for your engineering career at Allison, the only manufacturer whose jet engines have accumulated over three million hours in the air!

For further information about YOUR engineering career at ALLISON, discuss it with your Placement Counselor and arrange for an early interview with the ALLISON representative the next time he visits your campus. Or, write now for further information: R. G. Greenwood, Engineering College Contact, Allison Division, General Motors Corporation, Indianapolis 6, Indiana.

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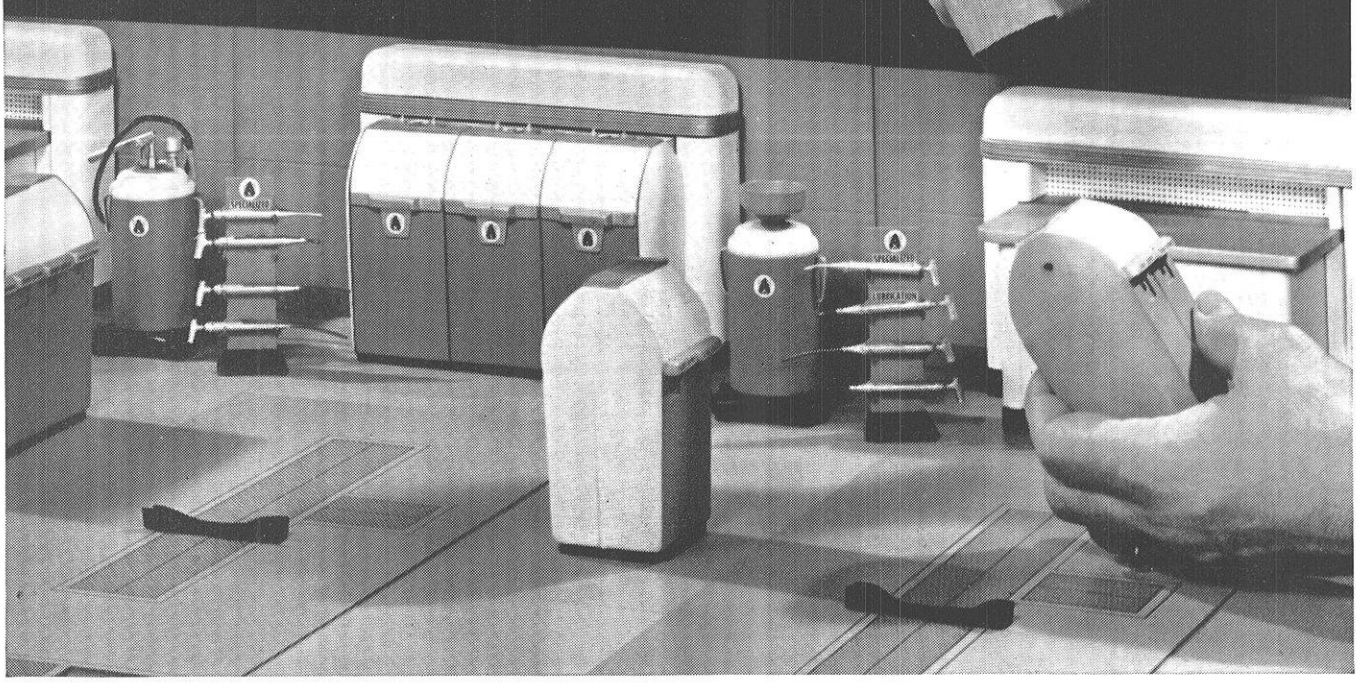
PHOTOGRAPHY AT WORK—No. 8 in a Kodak Series

Kodak
TRADE-MARK

Photography shows prospects

how their new service stations are going to look and operate



Alemite sets up scale models of their service station equipment on the customer's own floor plan—photographs them—and portrays the new custom-built station ready for action

SALESMEN don't just pull lube racks, grease pumps and other service station equipment out of a sample case. They're far too big—far too bulky. Besides, final location and arrangement count heavily in how well they are going to work out.

The Alemite Division of Stewart-Warner solves the problem with photography. Prospects see new service station equipment virtually right in their own premises.

It works this way. The salesman sends in a rough sketch of the space available, with windows and columns marked. Experts fit exact replicas of racks, lifts, and other equipment to the plan, then put the camera to work. The customer pictures his new station—modern, efficient, handsome—and the sale is well on its way. It's an idea for any company with bulky products to sell. Photography is a great salesman for any business, large or small. And it's very much more. It works in all kinds of ways to save time, cut costs, reduce error and improve production.

Graduates in the physical sciences and in engineering find photography an increasingly valuable tool in their new occupations. Its expanding use has also created many challenging opportunities at Kodak, especially in the development of large-scale chemical processes and the design of complex precision mechanical-electronic equipment. Whether you are a recent graduate or a qualified returning service man, if you are interested in these opportunities, write to Business & Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N.Y.

Eastman Kodak Company, Rochester 4, N.Y.

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Career opportunities with a bright future await the college graduate who joins General Electric. To help him toward early success, G.E. offers these ten programs—each including both challenging work assignments and broadening classroom studies.

If you are interested in building a career with General Electric, consult your placement officer for the date of the next visit of the G-E representative on your campus. Meanwhile, for further information on the career programs described here, write: College Editor, Dept. 2-123, General Electric Co., Schenectady, N. Y.

ENGINEERING PROGRAM

This program gives engineers a sound foundation for professional careers—in research, development, design, manufacturing, application, sales, installation and service, or advertising.

APPARATUS SALES ENGINEERING

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Open to technical and some non-technical graduates, this three-year program provides leadership training in manufacturing supervision, manufacturing engineering, purchasing, production control, or plant engineering.

BUSINESS TRAINING COURSE

BTC's purpose is to develop business administration, economics, liberal arts, and other graduates in accounting and related studies for leadership in G.E.'s financial activities and other activities which require business training.

PHYSICS PROGRAM

For Bachelor and Master graduates, this program gives industrial training and orientation in many fields of physics at G.E.—and offers great diversity in placement openings.

MARKETING TRAINING

Open to MBA graduates, and to young men who have shown special ability in marketing, this program develops men for future managerial positions through training in all seven primary functions of marketing.

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Open to chemists, metallurgists, chemical, ceramic, and metallurgical engineers at BS and MS level. Assignments extend from process development to plant liaison from research and development to sale of process instruments.

EMPLOYEE & PLANT COMMUNITY RELATIONS TRAINING

Open to technical and non-technical graduates, this leadership training program provides assignments in engineering, manufacturing, marketing, finance, and employee and plant community relations.

ATOMIC "TEST"

Open to science and engineering graduates, this program is conducted in the Hanford Atomic Products Operation at Richland, Washington to train men for positions in the atomic energy field.

ADVERTISING TRAINING COURSE

This program combines on-the-job training with integrated classwork courses and offers the opportunity to learn all aspects of industrial advertising, sales promotion, and public relations.

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